

#16/a

SEQUENCE LISTING

<110> Waldmann, Rainer

<120> MAMMAL NEURONAL ACID SENSING CATIONIC  
CHANNEL, CLONING AND APPLICATIONS THEREOF

<130> 989.6701P

<140> 09/129,758

<141> 1998-08-05

<150> PCT/FR98/00270

<151> 1998-02-11

<150> FR 97/01574

<151> 1997-02-11

<150> FR 97/09587

<151> 1997-07-28

<160> 18

<170> PatentIn Ver. 2.0

<210> 1

<211> 3562

<212> DNA

<213> rat

<220>

<221> CDS

<222> (123)..(1700)

<400> 1

cacacacaca cacacacaca cacacacaca cacacacaca cacacagaac ctgcgcctgt 60

gcctgtgcct gtgcctgtgc ctgtttgaga gctggagaca cagaaggatc cccttgga 120

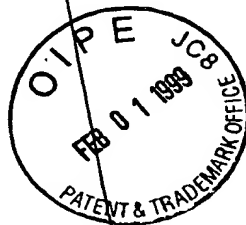
gg atg gaa ttg aag acc gag gag gag gag gtg ggt ggt gtc cag ccg 167  
Met Glu Leu Lys Thr Glu Glu Glu Glu Val Gly Gly Val Gln Pro  
1 5 10 15

gtg agc atc cag gct ttc gcc agc agc tcc acg ctg cat ggt ctt gcc 215  
Val Ser Ile Gln Ala Phe Ala Ser Ser Ser Thr Leu His Gly Leu Ala  
20 25 30

cac atc ttc tcc tat gag cgg ctg tct ctg aag cgg gca ctg tgg gcc 263  
His Ile Phe Ser Tyr Glu Arg Leu Ser Leu Lys Arg Ala Leu Trp Ala  
35 40 45

ctg tgc ttc ctg ggt tgc ctg gcc gtc ctg ctg tgt gtg tgc act gag 311  
Leu Cys Phe Leu Gly Ser Leu Ala Val Leu Leu Cys Val Cys Thr Glu  
50 55 60

cgt gtg cag tac tac ttc tgc tat cac cac gtc acc aag ctt gac gaa 359  
Arg Val Gln Tyr Tyr Phe Cys Tyr His His Val Thr Lys Leu Asp Glu  
65 70 75



Sub  
C/D

|   |      |
|---|------|
| gtg gct gcc tcc cag ctc acc ttc cct gct gtc aca ctg tgc aat ctc | 407  |
| Val Ala Ala Ser Gln Leu Thr Phe Pro Ala Val Thr Leu Cys Asn Leu |      |
| 80 85 90 95   |      |
| aat gag ttc cgc ttt agc caa gtc tcc aag aat gac ctg tac cat gct | 455  |
| Asn Glu Phe Arg Phe Ser Gln Val Ser Lys Asn Asp Leu Tyr His Ala |      |
| 100 105 110   |      |
| ggg gag ctg ctg gcc ctg ctc aac aac agg tat gag atc ccg gac aca | 503  |
| Gly Glu Leu Leu Ala Leu Leu Asn Asn Arg Tyr Glu Ile Pro Asp Thr |      |
| 115 120 125   |      |
| cag atg gct gat gaa aag cag cta gag ata ttg cag gac aag gcc aac | 551  |
| Gln Met Ala Asp Glu Lys Gln Leu Glu Ile Leu Gln Asp Lys Ala Asn |      |
| 130 135 140   |      |
| ttc cgg agc ttc aag ccc aag ccc ttc aac atg cgt gaa ttc tac gac | 599  |
| Phe Arg Ser Phe Lys Pro Lys Pro Phe Asn Met Arg Glu Phe Tyr Asp |      |
| 145 150 155   |      |
| aga gcg ggg cac gat att cga gac atg ctg ctc tcg tgc cac ttc cgt | 647  |
| Arg Ala Gly His Asp Ile Arg Asp Met Leu Ser Cys His Phe Arg     |      |
| 160 165 170 175   |      |
| ggg gag gcc tgc agc gct gaa gat ttc aaa gtg gtc ttc act cgg tat | 695  |
| Gly Glu Ala Cys Ser Ala Glu Asp Phe Lys Val Val Phe Thr Arg Tyr |      |
| 180 185 190   |      |
| ggg aag tgt tac aca ttc aac tcg ggc caa gat ggg cgg cca cgg ctg | 743  |
| Gly Lys Cys Tyr Thr Phe Asn Ser Gly Gln Asp Gly Arg Pro Arg Leu |      |
| 195 200 205   |      |
| aag acc atg aaa ggt ggg act ggc aat ggc ctg gag atc atg ctg gac | 791  |
| Lys Thr Met Lys Gly Gly Thr Gly Asn Gly Leu Glu Ile Met Leu Asp |      |
| 210 215 220   |      |
| att cag caa gat gaa tat ttg cct gtg tgg gga gag acc gac gag aca | 839  |
| Ile Gln Gln Asp Glu Tyr Leu Pro Val Trp Gly Glu Thr Asp Glu Thr |      |
| 225 230 235   |      |
| tcc ttc gaa gca ggc atc aaa gtg cag atc cac agt cag gat gaa ccc | 887  |
| Ser Phe Glu Ala Gly Ile Lys Val Gln Ile His Ser Gln Asp Glu Pro |      |
| 240 245 250 255   |      |
| cct ttc atc gac cag ctg ggc ttt ggt gtg gct cca ggt ttc cag acg | 935  |
| Pro Phe Ile Asp Gln Leu Gly Phe Gly Val Ala Pro Gly Phe Gln Thr |      |
| 260 265 270   |      |
| ttt gtg tct tgc cag gag cag agg ctc atc tac ctg ccc tca ccc tgg | 983  |
| Phe Val Ser Cys Gln Glu Gln Arg Leu Ile Tyr Leu Pro Ser Pro Trp |      |
| 275 280 285   |      |
| ggc acc tgc aat gct gtt acc atg gac tcg gat ttc ttc gac tcc tac | 1031 |
| Gly Thr Cys Asn Ala Val Thr Met Asp Ser Asp Phe Phe Asp Ser Tyr |      |
| 290 295 300   |      |
| agc atc act gcc tgc cgg att gat tgc gag acg cgt tac ctg gtg gag | 1079 |
| Ser Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Leu Val Glu |      |
| 305 310 315   |      |

|   |      |
|---|------|
| aac tgc aac tgc cgt atg gtg cac atg cca ggg gac gcc cca tac tgc   | 1127 |
| Asn Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Tyr Cys   |      |
| 320 325 330 335   |      |
| act cca gag cag tac aag gag tgt gca gat cct gcc ctg gac ttc cta   | 1175 |
| Thr Pro Glu Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu Asp Phe Leu   |      |
| 340 345 350   |      |
| gtg gag aaa gac cag gaa tac tgc gtg tgt gag atg cct tgc aac ctg   | 1223 |
| Val Glu Lys Asp Gln Glu Tyr Cys Val Cys Glu Met Pro Cys Asn Leu   |      |
| 355 360 365   |      |
| acc cgc tac ggc aag gag ctg tcc atg gtc aag atc cca agc aaa gcc   | 1271 |
| Thr Arg Tyr Gly Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Ala   |      |
| 370 375 380   |      |
| tcc gcc aag tac ctg gcc aag aag ttc aac aaa tcg gag cag tac ata   | 1319 |
| Ser Ala Lys Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu Gln Tyr Ile   |      |
| 385 390 395   |      |
| ggg gag aac att ctg gtg ctg gac att ttc ttt gaa gtc ctc aac tat   | 1367 |
| Gly Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Val Leu Asn Tyr   |      |
| 400 405 410 415   |      |
| gag acc atc gag cag aaa aag gcc tat gag atc gca ggg ctg ttg ggt   | 1415 |
| Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly Leu Leu Gly   |      |
| 420 425 430   |      |
| gac atc ggg ggc cag atg ggg ttg ttc atc ggt gcc agc atc ctc acc   | 1463 |
| Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr   |      |
| 435 440 445   |      |
| gtg ctg gaa ctc ttt gac tat gcc tac gag gtc att aag cac agg ctg   | 1511 |
| Val Leu Glu Leu Phe Asp Tyr Ala Tyr Glu Val Ile Lys His Arg Leu   |      |
| 450 455 460   |      |
| tgc aga cgt gga aag tgc cag aag gag gct aag agg agc agc gca gac   | 1559 |
| Cys Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser Ser Ala Asp   |      |
| 465 470 475   |      |
| aag ggc gtg gcg ctc agc ctg gat gac gtc aaa aga cac aat ccc tgc   | 1607 |
| Lys Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His Asn Pro Cys   |      |
| 480 485 490 495   |      |
| gag agc ctc cga gga cat cct gcc ggg atg acg tac gct gcc aac atc   | 1655 |
| Glu Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala Ala Asn Ile   |      |
| 500 505 510   |      |
| cta cct cac cat ccc gct cga ggc acg ttt gag gac ttt acc tgc       | 1700 |
| Leu Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe Thr Cys       |      |
| 515 520 525   |      |
| taagccctcg caggccgctg taccaaaggc ctagggtggg agggctggg gagcaagggg  | 1760 |
| cccccaactg cccccagcta cctgtggac ttaactgcat tcctggtcag tggttccctc  | 1820 |
| ttgtctgtgg tgagaaagga gtcttgacca tagagtcctc tcccagcctc tatcccatct | 1880 |
| ttttatttta atttaatcac atttgctctg taatattgct tgaggctggg gatcgtgatt | 1940 |
| tccccccagt tcttttattg ttgagaatag ttttctctat tctgggtttt ctgttatttc | 2000 |

```

aatgaatct gcaaattgct cttcccatct ctatgaagaa ttgcgttgga attttgatgg 2060
ggattgtatt gaatctgtag attgcctttg gtaagatggc catttttact atgttaatcc 2120
tgccaattca tgagcaaggg agatctttct atctctgaaa tctacttcag tttctttctt 2180
cagagacttg aagttcttgt cataaaaatc tttttggtta gagccacacc aaggtatttt 2240
atattgtttg tgactattgt gaatgggtgc atttccctaa tttccttctc agcctactta 2300
tcctttgagt agaggaaggc ttctgatttg tttgggttaa ttttataccc agctgctttg 2360
ctaaagttct ttatcaggtt taggtgttct ctggtggaac ttttggggtc acgtaagaat 2420
actattatat catctgcaa tagtgatatt tcacttcttc cttccaatt tctatccctc 2480
tggggacttt ttgttgtcta attgctctgg ctaggacttc aaattctata ttgaatagat 2540
agggagagag tgggcagcct tgtctagttc ctggttttcg tgggatcgct tcaaatttct 2600
ctccatttag tttgatattg gctactggtt tgctgtatat ggcttttact gtacttaggt 2660
atgggccttg aattcctgat atttccaaga cttttaacat gaaggggttt tgaaatttgc 2720
caaatgcttt ctacagatct aatgagatga tcatgtgccc tccccccacc ttgagtttgt 2780
ttatatagtg ggttacatga aaggatcatt tctaatagtc cacaagtctg ccaaattctg 2840
ctgattgtga ctcatctcca tagcaggctc tataacttct ctaacagatt gcattaaact 2900
ctgcttgggg aaggcattac ctcttggttg aagcaatgtt gtagtttcta tgctgtctga 2960
gtaaatagcc tcaagtccaa gtacttgccc agactaatga tcaaacgtat ccaggagttc 3020
cataccagag atgtactctt ctctcctttg aagtacattg ctggaagagt aattgtgttt 3080
gctagagata ctcttcgaa ctgcaaaaaga aatctcttgg ctaagcatat aatcaagcct 3140
caggttttct ttttattaaa tagctgcttg taagaaagtg gacactaagc atatacctca 3200
aaggagagaca gaatgactct gtgccttcac tgatggaagt ctgggttaca aattacatca 3260
gaagaaccta tcatagtga acatctcatt cccctggtat aatcccttct agaaatacac 3320
ttgtgactct gaaatgttat aatcgtgaca actaggctgt tacagataca ccaagttaaa 3380
tttgatagag aaaccaggct tggagcctca tgtccatagg gcaagaggaa gatgctgagt 3440
gtttaagggtt ggtttgagcg aagaacaata ccttgtgtca caaaaatgaa aggaaaaaag 3500
aaaaaaggaa agaaggaaaag aaagagagag aaagaaaaag aaagaaagaa aaaaaaaaaa 3560
aa

```

3562

```

<210> 2
<211> 526
<212> PRT
<213> rat

```

&lt;400&gt; 2

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Glu | Leu | Lys | Thr | Glu | Glu | Glu | Glu | Val | Gly | Gly | Val | Gln | Pro | Val |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Ile | Gln | Ala | Phe | Ala | Ser | Ser | Ser | Thr | Leu | His | Gly | Leu | Ala | His |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ile | Phe | Ser | Tyr | Glu | Arg | Leu | Ser | Leu | Lys | Arg | Ala | Leu | Trp | Ala | Leu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Cys | Phe | Leu | Gly | Ser | Leu | Ala | Val | Leu | Leu | Cys | Val | Cys | Thr | Glu | Arg |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Val | Gln | Tyr | Tyr | Phe | Cys | Tyr | His | His | Val | Thr | Lys | Leu | Asp | Glu | Val |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Ala | Ala | Ser | Gln | Leu | Thr | Phe | Pro | Ala | Val | Thr | Leu | Cys | Asn | Leu | Asn |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Glu | Phe | Arg | Phe | Ser | Gln | Val | Ser | Lys | Asn | Asp | Leu | Tyr | His | Ala | Gly |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Glu | Leu | Leu | Ala | Leu | Leu | Asn | Asn | Arg | Tyr | Glu | Ile | Pro | Asp | Thr | Gln |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Met | Ala | Asp | Glu | Lys | Gln | Leu | Glu | Ile | Leu | Gln | Asp | Lys | Ala | Asn | Phe |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Arg | Ser | Phe | Lys | Pro | Lys | Pro | Phe | Asn | Met | Arg | Glu | Phe | Tyr | Asp | Arg |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Ala | Gly | His | Asp | Ile | Arg | Asp | Met | Leu | Leu | Ser | Cys | His | Phe | Arg | Gly |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Glu | Ala | Cys | Ser | Ala | Glu | Asp | Phe | Lys | Val | Val | Phe | Thr | Arg | Tyr | Gly |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Lys | Cys | Tyr | Thr | Phe | Asn | Ser | Gly | Gln | Asp | Gly | Arg | Pro | Arg | Leu | Lys |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Thr | Met | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu | Glu | Ile | Met | Leu | Asp | Ile |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Val | Trp | Gly | Glu | Thr | Asp | Glu | Thr | Ser |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Phe | Glu | Ala | Gly | Ile | Lys | Val | Gln | Ile | His | Ser | Gln | Asp | Glu | Pro | Pro |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Phe | Ile | Asp | Gln | Leu | Gly | Phe | Gly | Val | Ala | Pro | Gly | Phe | Gln | Thr | Phe |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Val | Ser | Cys | Gln | Glu | Gln | Arg | Leu | Ile | Tyr | Leu | Pro | Ser | Pro | Trp | Gly |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Thr | Cys | Asn | Ala | Val | Thr | Met | Asp | Ser | Asp | Phe | Phe | Asp | Ser | Tyr | Ser |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Ile | Thr | Ala | Cys | Arg | Ile | Asp | Cys | Glu | Thr | Arg | Tyr | Leu | Val | Glu | Asn |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |

Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Tyr Cys Thr  
 325 330 335  
 Pro Glu Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu Asp Phe Leu Val  
 340 345 350  
 Glu Lys Asp Gln Glu Tyr Cys Val Cys Glu Met Pro Cys Asn Leu Thr  
 355 360 365  
 Arg Tyr Gly Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Ala Ser  
 370 375 380  
 Ala Lys Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu Gln Tyr Ile Gly  
 385 390 395 400  
 Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Val Leu Asn Tyr Glu  
 405 410 415  
 Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly Leu Leu Gly Asp  
 420 425 430  
 Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr Val  
 435 440 445  
 Leu Glu Leu Phe Asp Tyr Ala Tyr Glu Val Ile Lys His Arg Leu Cys  
 450 455 460  
 Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser Ser Ala Asp Lys  
 465 470 475 480  
 Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His Asn Pro Cys Glu  
 485 490 495  
 Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala Ala Asn Ile Leu  
 500 505 510  
 Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe Thr Cys  
 515 520 525

<210> 3  
 <211> 1620  
 <212> DNA  
 <213> human

<220>  
 <221> CDS  
 <222> (1)..(1542)

<400> 3  
 ccg gtg agc atc cag gcc ttc gcc agc agc tcc aca ctg cac ggc atg 48  
 Pro Val Ser Ile Gln Ala Phe Ala Ser Ser Ser Thr Leu His Gly Met  
 1 5 10 15  
 gcc cac atc ttc tcc tac gag cgg ctg tct ctg aag cgg gca ctg tgg 96  
 Ala His Ile Phe Ser Tyr Glu Arg Leu Ser Leu Lys Arg Ala Leu Trp  
 20 25 30  
 gcc ctg tgc ttc ctg ggc tcg ctg gct gtg ctg ctg tgt gtg tgc acg 144  
 Ala Leu Cys Phe Leu Gly Ser Leu Ala Val Leu Leu Cys Val Cys Thr  
 35 40 45

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gag | cgt | gtg | cag | tac | tac | ttc | cac | tac | cac | cat | gtc | acc | aag | ctc | gac | 192 |
| Glu | Arg | Val | Gln | Tyr | Tyr | Phe | His | Tyr | His | His | Val | Thr | Lys | Leu | Asp |     |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| gag | gtg | gct | gcc | tct | cag | ctt | acc | ttc | cct | gct | gtc | acg | ctg | tgc | aac | 240 |
| Glu | Val | Ala | Ala | Ser | Gln | Leu | Thr | Phe | Pro | Ala | Val | Thr | Leu | Cys | Asn |     |
|     | 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| ctc | aac | gag | ttc | cgc | ttt | agc | caa | gtc | tcc | aag | aat | gac | ctg | tat | cat | 288 |
| Leu | Asn | Glu | Phe | Arg | Phe | Ser | Gln | Val | Ser | Lys | Asn | Asp | Leu | Tyr | His |     |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| gct | ggg | gag | ctg | ctg | gcc | ctg | ctc | aac | aac | agg | tat | gag | ata | cca | gac | 336 |
| Ala | Gly | Glu | Leu | Leu | Ala | Leu | Leu | Asn | Asn | Arg | Tyr | Glu | Ile | Pro | Asp |     |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |
| aca | cag | atg | gca | gat | gaa | aag | cag | ctg | gag | ata | ctg | cag | gac | aaa | gcc | 384 |
| Thr | Gln | Met | Ala | Asp | Glu | Lys | Gln | Leu | Glu | Ile | Leu | Gln | Asp | Lys | Ala |     |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |
| aac | ttc | cgc | agc | ttc | aaa | ccc | aaa | ccc | ttc | aac | atg | cgt | gag | ttc | tac | 432 |
| Asn | Phe | Arg | Ser | Phe | Lys | Pro | Lys | Pro | Phe | Asn | Met | Arg | Glu | Phe | Tyr |     |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |     |
| gac | cga | gct | ggg | cac | gac | att | cga | gac | atg | ctg | ctc | tcc | tgc | cac | ttc | 480 |
| Asp | Arg | Ala | Gly | His | Asp | Ile | Arg | Asp | Met | Leu | Leu | Ser | Cys | His | Phe |     |
|     | 145 |     |     |     | 150 |     |     |     | 155 |     |     |     |     |     | 160 |     |
| cgg | ggg | gag | gtc | tgc | agc | gct | gaa | gac | ttc | aag | gtg | gtc | ttc | aca | cgc | 528 |
| Arg | Gly | Glu | Val | Cys | Ser | Ala | Glu | Asp | Phe | Lys | Val | Val | Phe | Thr | Arg |     |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |
| tat | gga | aag | tgc | tac | acg | ttc | aac | tcg | ggc | cga | aat | ggg | cgg | ccg | cgg | 576 |
| Tyr | Gly | Lys | Cys | Tyr | Thr | Phe | Asn | Ser | Gly | Arg | Asn | Gly | Arg | Pro | Arg |     |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |     |
| ctg | aag | acc | atg | aag | ggt | ggg | acg | ggc | aat | ggg | ctg | gaa | atc | atg | ctg | 624 |
| Leu | Lys | Thr | Met | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu | Glu | Ile | Met | Leu |     |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |     |
| gac | atc | cag | cag | gac | gag | tac | ctg | cct | gtg | tgg | ggg | gag | act | gac | gag | 672 |
| Asp | Ile | Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Val | Trp | Gly | Glu | Thr | Asp | Glu |     |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
| acg | tct | ttc | gaa | gca | ggc | atc | aaa | gtg | cag | atc | cat | agt | cag | gat | gaa | 720 |
| Thr | Ser | Phe | Glu | Ala | Gly | Ile | Lys | Val | Gln | Ile | His | Ser | Gln | Asp | Glu |     |
|     | 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| cct | cct | ttc | atc | gac | cag | ctg | ggc | ttt | ggc | gtg | gcc | cca | ggc | ttc | cag | 768 |
| Pro | Pro | Phe | Ile | Asp | Gln | Leu | Gly | Phe | Gly | Val | Ala | Pro | Gly | Phe | Gln |     |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| acc | ttt | gtg | gcc | tgc | cag | gag | cag | cgg | ctc | ata | tac | ctg | ccc | cca | ccc | 816 |
| Thr | Phe | Val | Ala | Cys | Gln | Glu | Gln | Arg | Leu | Ile | Tyr | Leu | Pro | Pro | Pro |     |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |     |
| tgg | ggc | acc | tgc | aaa | gct | gtt | acc | atg | gac | tcg | gat | ttg | gat | ttc | ttc | 864 |
| Trp | Gly | Thr | Cys | Lys | Ala | Val | Thr | Met | Asp | Ser | Asp | Leu | Asp | Phe | Phe |     |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |     |

|   |      |
|---|------|
| gac tcc tac agc atc act gcc tgc cgc atc gac tgt gag acg cgc tac<br>Asp Ser Tyr Ser Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr<br>290 295 300     | 912  |
| ctg gtg gag aac tgc aac tgc cgc atg gtg cac atg cca ggg gat gcc<br>Leu Val Glu Asn Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala<br>305 310 315 320 | 960  |
| cca tac tgt act cca gag cag tac aag gag tgt gca gat cct gct ctg<br>Pro Tyr Cys Thr Pro Glu Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu<br>325 330 335     | 1008 |
| gac ttc ctg gtg gag aag gac cag gag tac tgc gtg tgt gaa atg cct<br>Asp Phe Leu Val Glu Lys Asp Gln Glu Tyr Cys Val Cys Glu Met Pro<br>340 345 350     | 1056 |
| tgc aac ctg acc cgc tat ggc aaa gag ctg tcc atg gtc aag atc ccc<br>Cys Asn Leu Thr Arg Tyr Gly Lys Glu Leu Ser Met Val Lys Ile Pro<br>355 360 365     | 1104 |
| agc aaa gcc tca gcc aag tac ctg gcc aag aag ttc aac aaa tct gag<br>Ser Lys Ala Ser Ala Lys Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu<br>370 375 380     | 1152 |
| caa tac ata ggg gag aac atc ctg gtg ctg gac att ttc ttt gaa gtc<br>Gln Tyr Ile Gly Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Val<br>385 390 395 400 | 1200 |
| ctc aac tat gag acc att gaa cag aag aag gcc tat gag att gca ggg<br>Leu Asn Tyr Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly<br>405 410 415     | 1248 |
| ctc ctg ggt gac atc ggg ggc cag atg ggg ctg ttc atc ggg gcc agc<br>Leu Leu Gly Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser<br>420 425 430     | 1296 |
| atc ctc acg gtg ctg gag ctc ttt gac tac gcc tac ggg gtc att aag<br>Ile Leu Thr Val Leu Glu Leu Phe Asp Tyr Ala Tyr Gly Val Ile Lys<br>435 440 445     | 1344 |
| cac aag ctg tgc cga cga gga aaa tgc cag aag gag gcc aaa agg agc<br>His Lys Leu Cys Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser<br>450 455 460     | 1392 |
| agt gcg gac aag ggc gtg gcc ctc agc ctg gac gac gtc aaa aga cac<br>Ser Ala Asp Lys Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His<br>465 470 475 480 | 1440 |
| aac ccg tgc gag agc ctt cgg ggc cac cct gcc ggg atg aca tac gct<br>Asn Pro Cys Glu Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala<br>485 490 495     | 1488 |
| gcc aac atc gta cct cac cat ccg gcc cga ggc acg ttc gag gac ttt<br>Ala Asn Ile Val Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe<br>500 505 510     | 1536 |
| acc tgc tgagccccgc aggccgccga accaaagacc tagatgggga ggactaggag<br>Thr Cys   | 1592 |
| agcgaggggg cccccagctg cctcctaa  | 1620 |



<210> 4  
 <211> 514  
 <212> PRT  
 <213> human

<400> 4

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Val | Ser | Ile | Gln | Ala | Phe | Ala | Ser | Ser | Ser | Thr | Leu | His | Gly | Met | 1   | 5   | 10  | 15  |
| Ala | His | Ile | Phe | Ser | Tyr | Glu | Arg | Leu | Ser | Leu | Lys | Arg | Ala | Leu | Trp | 20  | 25  | 30  |     |
| Ala | Leu | Cys | Phe | Leu | Gly | Ser | Leu | Ala | Val | Leu | Leu | Cys | Val | Cys | Thr | 35  | 40  | 45  |     |
| Glu | Arg | Val | Gln | Tyr | Tyr | Phe | His | Tyr | His | His | Val | Thr | Lys | Leu | Asp | 50  | 55  | 60  |     |
| Glu | Val | Ala | Ala | Ser | Gln | Leu | Thr | Phe | Pro | Ala | Val | Thr | Leu | Cys | Asn | 65  | 70  | 75  | 80  |
| Leu | Asn | Glu | Phe | Arg | Phe | Ser | Gln | Val | Ser | Lys | Asn | Asp | Leu | Tyr | His | 85  | 90  | 95  |     |
| Ala | Gly | Glu | Leu | Leu | Ala | Leu | Leu | Asn | Asn | Arg | Tyr | Glu | Ile | Pro | Asp | 100 | 105 | 110 |     |
| Thr | Gln | Met | Ala | Asp | Glu | Lys | Gln | Leu | Glu | Ile | Leu | Gln | Asp | Lys | Ala | 115 | 120 | 125 |     |
| Asn | Phe | Arg | Ser | Phe | Lys | Pro | Lys | Pro | Phe | Asn | Met | Arg | Glu | Phe | Tyr | 130 | 135 | 140 |     |
| Asp | Arg | Ala | Gly | His | Asp | Ile | Arg | Asp | Met | Leu | Leu | Ser | Cys | His | Phe | 145 | 150 | 155 | 160 |
| Arg | Gly | Glu | Val | Cys | Ser | Ala | Glu | Asp | Phe | Lys | Val | Val | Phe | Thr | Arg | 165 | 170 | 175 |     |
| Tyr | Gly | Lys | Cys | Tyr | Thr | Phe | Asn | Ser | Gly | Arg | Asn | Gly | Arg | Pro | Arg | 180 | 185 | 190 |     |
| Leu | Lys | Thr | Met | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu | Glu | Ile | Met | Leu | 195 | 200 | 205 |     |
| Asp | Ile | Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Val | Trp | Gly | Glu | Thr | Asp | Glu | 210 | 215 | 220 |     |
| Thr | Ser | Phe | Glu | Ala | Gly | Ile | Lys | Val | Gln | Ile | His | Ser | Gln | Asp | Glu | 225 | 230 | 235 | 240 |
| Pro | Pro | Phe | Ile | Asp | Gln | Leu | Gly | Phe | Gly | Val | Ala | Pro | Gly | Phe | Gln | 245 | 250 | 255 |     |
| Thr | Phe | Val | Ala | Cys | Gln | Glu | Gln | Arg | Leu | Ile | Tyr | Leu | Pro | Pro | Pro | 260 | 265 | 270 |     |
| Trp | Gly | Thr | Cys | Lys | Ala | Val | Thr | Met | Asp | Ser | Asp | Leu | Asp | Phe | Phe | 275 | 280 | 285 |     |

Asp Ser Tyr Ser Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr  
 290 295 300  
 Leu Val Glu Asn Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala  
 305 310 315 320  
 Pro Tyr Cys Thr Pro Glu Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu  
 325 330 335  
 Asp Phe Leu Val Glu Lys Asp Gln Glu Tyr Cys Val Cys Glu Met Pro  
 340 345 350  
 Cys Asn Leu Thr Arg Tyr Gly Lys Glu Leu Ser Met Val Lys Ile Pro  
 355 360 365  
 Ser Lys Ala Ser Ala Lys Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu  
 370 375 380  
 Gln Tyr Ile Gly Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Val  
 385 390 395 400  
 Leu Asn Tyr Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly  
 405 410 415  
 Leu Leu Gly Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser  
 420 425 430  
 Ile Leu Thr Val Leu Glu Leu Phe Asp Tyr Ala Tyr Gly Val Ile Lys  
 435 440 445  
 His Lys Leu Cys Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser  
 450 455 460  
 Ser Ala Asp Lys Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His  
 465 470 475 480  
 Asn Pro Cys Glu Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala  
 485 490 495  
 Ala Asn Ile Val Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe  
 500 505 510  
 Thr Cys

<210> 5  
 <211> 1666  
 <212> DNA  
 <213> human

<220>  
 <221> CDS  
 <222> (128)..(1663)

<400> 5  
 tctggcgcga tgcttacctt gogttctctc ccctgaacgt caaggtttta gacagagcccg 60  
 aggactggga gctcttctct gaaattcgat caacctgaag ccagttgcgg aactgcacgg 120

|          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gggtcccg | atg | gac | ctc | aag | gaa | agc | ccc | agt | gag | ggc | agc | ctg | caa | cct | 169 |     |
| Met      | Asp | Leu | Lys | Glu | Ser | Pro | Ser | Glu | Gly | Ser | Leu | Gln | Pro |     |     |     |
| 1        |     |     |     | 5   |     |     |     |     |     | 10  |     |     |     |     |     |     |
| tct      | agc | atc | cag | atc | ttt | gcc | aac | acc | tcc | acc | ctc | cat | ggc | atc | cgc | 217 |
| Ser      | Ser | Ile | Gln | Ile | Phe | Ala | Asn | Thr | Ser | Thr | Leu | His | Gly | Ile | Arg |     |
| 15       |     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |
| cac      | atc | ttc | gtg | tat | ggg | ccg | ctg | acc | atc | cgg | cgt | gtg | ctg | tgg | gca | 265 |
| His      | Ile | Phe | Val | Tyr | Gly | Pro | Leu | Thr | Ile | Arg | Arg | Val | Leu | Trp | Ala |     |
|          |     |     | 35  |     |     |     |     | 40  |     |     |     |     |     | 45  |     |     |
| gtg      | gcc | ttc | gtg | ggc | tct | ctg | ggc | ctg | ctg | ctg | gtg | gag | agc | tct | gag | 313 |
| Val      | Ala | Phe | Val | Gly | Ser | Leu | Gly | Leu | Leu | Leu | Val | Glu | Ser | Ser | Glu |     |
|          |     |     | 50  |     |     |     | 55  |     |     |     |     |     | 60  |     |     |     |
| agg      | gtg | tcc | tac | tac | ttc | tcc | tac | cag | cat | gtc | act | aag | gtg | gac | gaa | 361 |
| Arg      | Val | Ser | Tyr | Tyr | Phe | Ser | Tyr | Gln | His | Val | Thr | Lys | Val | Asp | Glu |     |
|          |     | 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     |
| gtg      | gtg | gct | caa | agc | ctg | gtc | ttc | cca | gct | gtg | acc | ctc | tgt | aac | ctc | 409 |
| Val      | Val | Ala | Gln | Ser | Leu | Val | Phe | Pro | Ala | Val | Thr | Leu | Cys | Asn | Leu |     |
|          | 80  |     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     |
| aat      | ggc | ttc | cgg | ttc | tcc | agg | ctc | acc | acc | aac | gac | ctg | tac | cat | gct | 457 |
| Asn      | Gly | Phe | Arg | Phe | Ser | Arg | Leu | Thr | Thr | Asn | Asp | Leu | Tyr | His | Ala |     |
| 95       |     |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |
| ggg      | gag | ctg | ctg | gcc | ctg | ctg | gat | gtc | aac | ctg | cag | atc | ccg | gac | ccc | 505 |
| Gly      | Glu | Leu | Leu | Ala | Leu | Leu | Asp | Val | Asn | Leu | Gln | Ile | Pro | Asp | Pro |     |
|          |     |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |
| cat      | ctg | gct | gac | ccc | tcc | gtg | ctg | gag | gcc | ctg | cgg | cag | aag | gcc | aac | 553 |
| His      | Leu | Ala | Asp | Pro | Ser | Val | Leu | Glu | Ala | Leu | Arg | Gln | Lys | Ala | Asn |     |
|          |     |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |
| ttc      | aag | cac | tac | aaa | ccc | aag | cag | ttc | agc | atg | ctg | gag | ttc | ctg | cac | 601 |
| Phe      | Lys | His | Tyr | Lys | Pro | Lys | Gln | Phe | Ser | Met | Leu | Glu | Phe | Leu | His |     |
|          |     | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     |
| cgt      | gtg | ggc | cat | gac | ctg | aag | gat | atg | atg | ctc | tac | tgc | aag | ttc | aaa | 649 |
| Arg      | Val | Gly | His | Asp | Leu | Lys | Asp | Met | Met | Leu | Tyr | Cys | Lys | Phe | Lys |     |
|          | 160 |     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     |
| ggg      | cag | gag | tgc | ggc | cac | caa | gac | ttc | acc | aca | gtg | ttt | aca | aaa | tat | 697 |
| Gly      | Gln | Glu | Cys | Gly | His | Gln | Asp | Phe | Thr | Thr | Val | Phe | Thr | Lys | Tyr |     |
| 175      |     |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |
| ggg      | aag | tgt | tac | atg | ttt | aac | tca | ggc | gag | gat | ggc | aaa | cct | ctg | ctc | 745 |
| Gly      | Lys | Cys | Tyr | Met | Phe | Asn | Ser | Gly | Glu | Asp | Gly | Lys | Pro | Leu | Leu |     |
|          |     |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |
| acc      | acg | gtc | aag | ggg | ggg | aca | ggc | aac | ggg | ctg | gag | atc | atg | ctg | gac | 793 |
| Thr      | Thr | Val | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu | Glu | Ile | Met | Leu | Asp |     |
|          |     |     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |
| att      | cag | cag | gat | gag | tac | ctg | ccc | atc | tgg | gga | gag | aca | gag | gaa | acg | 841 |
| Ile      | Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Ile | Trp | Gly | Glu | Thr | Glu | Glu | Thr |     |
|          |     | 225 |     |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     |

|   |      |
|---|------|
| aca ttt gaa gca gga gtg aaa gtt cag atc cac agt cag tct gag cca | 889  |
| Thr Phe Glu Ala Gly Val Lys Val Gln Ile His Ser Gln Ser Glu Pro |      |
| 240 245 250   |      |
| cct ttc atc caa gag ctg ggc ttt ggg gtg gct cca ggg ttc cag acc | 937  |
| Pro Phe Ile Gln Glu Leu Gly Phe Gly Val Ala Pro Gly Phe Gln Thr |      |
| 255 260 265 270   |      |
| ttt gtg gcc aca cag gag cag agg ctc aca tac ctg ccc cca ccg tgg | 985  |
| Phe Val Ala Thr Gln Glu Gln Arg Leu Thr Tyr Leu Pro Pro Pro Trp |      |
| 275 280 285   |      |
| ggg gag tgc cga tcc tca gag atg ggc ctc gac ttt ttt cct gtt tac | 1033 |
| Gly Glu Cys Arg Ser Ser Glu Met Gly Leu Asp Phe Phe Pro Val Tyr |      |
| 290 295 300   |      |
| agc atc acc gcc tgt agg att gac tgt gag acc cgc tac att gtg gaa | 1081 |
| Ser Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Ile Val Glu |      |
| 305 310 315   |      |
| aac tgc aac tgc cgc atg gtt cac atg cca ggg gat gcc cct ttt tgt | 1129 |
| Asn Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Phe Cys |      |
| 320 325 330   |      |
| acc cct gag cag cac aag gag tgt gca gag cct gcc cta ggt ctg ttg | 1177 |
| Thr Pro Glu Gln His Lys Glu Cys Ala Glu Pro Ala Leu Gly Leu Leu |      |
| 335 340 345 350   |      |
| gcg gaa aag gac agc aat tac tgt ctc tgc agg aca ccc tgc aac cta | 1225 |
| Ala Glu Lys Asp Ser Asn Tyr Cys Leu Cys Arg Thr Pro Cys Asn Leu |      |
| 355 360 365   |      |
| acc cgc tac aac aaa gag ctc tcc atg gtg aag atc ccc agc aag aca | 1273 |
| Thr Arg Tyr Asn Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Thr |      |
| 370 375 380   |      |
| tca gcc aag tac ctt gag aag aaa ttt aac aaa tca gaa aaa tat atc | 1321 |
| Ser Ala Lys Tyr Leu Glu Lys Lys Phe Asn Lys Ser Glu Lys Tyr Ile |      |
| 385 390 395   |      |
| tca gag aac atc ctt gtt ctg gat ata ttt ttt gaa gct ctc aat tat | 1369 |
| Ser Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Ala Leu Asn Tyr |      |
| 400 405 410   |      |
| gag aca att gaa cag aag aag gcg tat gaa gtt gct gcc tta ctt ggt | 1417 |
| Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Val Ala Ala Leu Leu Gly |      |
| 415 420 425 430   |      |
| gat att ggt ggt cag atg gga ttg ttc att ggt gct agt atc ctt aca | 1465 |
| Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr |      |
| 435 440 445   |      |
| ata cta gag ctc ttt gat tat att tat gag ctg atc aaa gag aag cta | 1513 |
| Ile Leu Glu Leu Phe Asp Tyr Ile Tyr Glu Leu Ile Lys Glu Lys Leu |      |
| 450 455 460   |      |
| tta gac ctg ctt ggc aaa gag gag gat gaa ggg agc cac gat gag aat | 1561 |
| Leu Asp Leu Leu Gly Lys Glu Glu Asp Glu Gly Ser His Asp Glu Asn |      |
| 465 470 475   |      |

gtg agt act tgt gac aca atg cca aac cac tct gaa acc atc agt cac 1609  
 Val Ser Thr Cys Asp Thr Met Pro Asn His Ser Glu Thr Ile Ser His  
 480 485 490

act gtg aac gtg ccc ctg cag acg acc ctg ggg acc ctg gaa gaa ata 1657  
 Thr Val Asn Val Pro Leu Gln Thr Thr Leu Gly Thr Leu Glu Glu Ile  
 495 500 505 510

gcc tgc tga 1666  
 Ala Cys

<210> 6  
 <211> 512  
 <212> PRT  
 <213> human

<400> 6  
 Met Asp Leu Lys Glu Ser Pro Ser Glu Gly Ser Leu Gln Pro Ser Ser  
 1 5 10 15

Ile Gln Ile Phe Ala Asn Thr Ser Thr Leu His Gly Ile Arg His Ile  
 20 25 30

Phe Val Tyr Gly Pro Leu Thr Ile Arg Arg Val Leu Trp Ala Val Ala  
 35 40 45

Phe Val Gly Ser Leu Gly Leu Leu Leu Val Glu Ser Ser Glu Arg Val  
 50 55 60

Ser Tyr Tyr Phe Ser Tyr Gln His Val Thr Lys Val Asp Glu Val Val  
 65 70 75 80

Ala Gln Ser Leu Val Phe Pro Ala Val Thr Leu Cys Asn Leu Asn Gly  
 85 90 95

Phe Arg Phe Ser Arg Leu Thr Thr Asn Asp Leu Tyr His Ala Gly Glu  
 100 105 110

Leu Leu Ala Leu Leu Asp Val Asn Leu Gln Ile Pro Asp Pro His Leu  
 115 120 125

Ala Asp Pro Ser Val Leu Glu Ala Leu Arg Gln Lys Ala Asn Phe Lys  
 130 135 140

His Tyr Lys Pro Lys Gln Phe Ser Met Leu Glu Phe Leu His Arg Val  
 145 150 155 160

Gly His Asp Leu Lys Asp Met Met Leu Tyr Cys Lys Phe Lys Gly Gln  
 165 170 175

Glu Cys Gly His Gln Asp Phe Thr Thr Val Phe Thr Lys Tyr Gly Lys  
 180 185 190

Cys Tyr Met Phe Asn Ser Gly Glu Asp Gly Lys Pro Leu Leu Thr Thr  
 195 200 205

Val Lys Gly Gly Thr Gly Asn Gly Leu Glu Ile Met Leu Asp Ile Gln  
 210 215 220

Gln Asp Glu Tyr Leu Pro Ile Trp Gly Glu Thr Glu Glu Thr Thr Phe  
 225 230 235 240  
 Glu Ala Gly Val Lys Val Gln Ile His Ser Gln Ser Glu Pro Pro Phe  
 245 250 255  
 Ile Gln Glu Leu Gly Phe Gly Val Ala Pro Gly Phe Gln Thr Phe Val  
 260 265 270  
 Ala Thr Gln Glu Gln Arg Leu Thr Tyr Leu Pro Pro Pro Trp Gly Glu  
 275 280 285  
 Cys Arg Ser Ser Glu Met Gly Leu Asp Phe Phe Pro Val Tyr Ser Ile  
 290 295 300  
 Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Ile Val Glu Asn Cys  
 305 310 315 320  
 Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Phe Cys Thr Pro  
 325 330 335  
 Glu Gln His Lys Glu Cys Ala Glu Pro Ala Leu Gly Leu Leu Ala Glu  
 340 345 350  
 Lys Asp Ser Asn Tyr Cys Leu Cys Arg Thr Pro Cys Asn Leu Thr Arg  
 355 360 365  
 Tyr Asn Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Thr Ser Ala  
 370 375 380  
 Lys Tyr Leu Glu Lys Lys Phe Asn Lys Ser Glu Lys Tyr Ile Ser Glu  
 385 390 395 400  
 Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Ala Leu Asn Tyr Glu Thr  
 405 410 415  
 Ile Glu Gln Lys Lys Ala Tyr Glu Val Ala Ala Leu Leu Gly Asp Ile  
 420 425 430  
 Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr Ile Leu  
 435 440 445  
 Glu Leu Phe Asp Tyr Ile Tyr Glu Leu Ile Lys Glu Lys Leu Leu Asp  
 450 455 460  
 Leu Leu Gly Lys Glu Glu Asp Glu Gly Ser His Asp Glu Asn Val Ser  
 465 470 475 480  
 Thr Cys Asp Thr Met Pro Asn His Ser Glu Thr Ile Ser His Thr Val  
 485 490 495  
 Asn Val Pro Leu Gln Thr Thr Leu Gly Thr Leu Glu Glu Ile Ala Cys  
 500 505 510

&lt;210&gt; 7

&lt;211&gt; 3647

&lt;212&gt; DNA

&lt;213&gt; rat

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (109)..(1785)

&lt;400&gt; 7

```

ctgccacaga ggctctggtg aggaaggaca gacagctgga ccggcgcaga cctagccgaa 60
gtccaacctc cgtcccttct ggtggcttct tcctgtctcc tgaacaag atg ccc atc 117
                                         Met Pro Ile
                                         1

cag atc ttt tgt tct gtg tca ttc tcc tct gga gag gag gcc ccg gga 165
Gln Ile Phe Cys Ser Val Ser Phe Ser Ser Gly Glu Glu Ala Pro Gly
      5                      10                      15

tcc atg gca gat atc tgg ggt ccc cac cac cac cgg cag cag cag gac 213
Ser Met Ala Asp Ile Trp Gly Pro His His His Arg Gln Gln Gln Asp
    20                      25                      30                      35

agc tca gaa tcg gaa gaa gag gaa gag aag gaa atg gag gca ggg tcg 261
Ser Ser Glu Ser Glu Glu Glu Glu Glu Lys Glu Met Glu Ala Gly Ser
                      40                      45                      50

gag ttg gat gag ggt gat gac tca cct agg gac ttg gtg gcc ttc gcc 309
Glu Leu Asp Glu Gly Asp Asp Ser Pro Arg Asp Leu Val Ala Phe Ala
      55                      60                      65

aac agc tgt acc ttc cat ggt gcc agc cat gtg ttt gtg gaa ggg ggc 357
Asn Ser Cys Thr Phe His Gly Ala Ser His Val Phe Val Glu Gly Gly
      70                      75                      80

cca ggg cca agg cag gcc tta tgg gca gtg gcc ttt gtc ata gca ctg 405
Pro Gly Pro Arg Gln Ala Leu Trp Ala Val Ala Phe Val Ile Ala Leu
      85                      90                      95

ggt gcc ttc ctg tgc cag gta ggg gac cgc gtt gct tat tac ctc agc 453
Gly Ala Phe Leu Cys Gln Val Gly Asp Arg Val Ala Tyr Tyr Leu Ser
    100                      105                      110                      115

tac cca cac gtg act ttg cta gac gaa gtg gcc acc acg gag ctg gtc 501
Tyr Pro His Val Thr Leu Leu Asp Glu Val Ala Thr Thr Glu Leu Val
      120                      125                      130

ttc cca gct gtc acc ttc tgc aac acc aat gcc gtg cgg ttg tcc cag 549
Phe Pro Ala Val Thr Phe Cys Asn Thr Asn Ala Val Arg Leu Ser Gln
      135                      140                      145

ctc agc tac cct gac ttg ctc tac ctg gcc ccc atg cta gga ctg gat 597
Leu Ser Tyr Pro Asp Leu Leu Tyr Leu Ala Pro Met Leu Gly Leu Asp
      150                      155                      160

gag agt gat gac ccc ggg gtg ccc ctt gct cct cct ggc cca gag gct 645
Glu Ser Asp Asp Pro Gly Val Pro Leu Ala Pro Pro Gly Pro Glu Ala
      165                      170                      175

ttc tcc ggg gag cct ttt aac ctc cat cgt ttc tat aat cgc tct tgc 693
Phe Ser Gly Glu Pro Phe Asn Leu His Arg Phe Tyr Asn Arg Ser Cys
    180                      185                      190                      195

cac cgg ctg gag gac atg ctg ctc tat tgt tcc tac tgt ggg ggc ccc 741
His Arg Leu Glu Asp Met Leu Leu Tyr Cys Ser Tyr Cys Gly Gly Pro
      200                      205                      210

```

|   |      |
|---|------|
| tgt ggt ccc cac aac ttc tca gtg gtc ttc act cgg tat ggg aag tgt | 789  |
| Cys Gly Pro His Asn Phe Ser Val Val Phe Thr Arg Tyr Gly Lys Cys |      |
| 215 220 225   |      |
| tac aca ttc aac tcg ggc caa gat ggg cgg cca cgg ctg aag acc atg | 837  |
| Tyr Thr Phe Asn Ser Gly Gln Asp Gly Arg Pro Arg Leu Lys Thr Met |      |
| 230 235 240   |      |
| aaa ggt ggg act ggc aat ggc ctg gag atc atg ctg gac att cag caa | 885  |
| Lys Gly Gly Thr Gly Asn Gly Leu Glu Ile Met Leu Asp Ile Gln Gln |      |
| 245 250 255   |      |
| gat gaa tat ttg cct gtg tgg gga gag acc gac gag aca tcc ttc gaa | 933  |
| Asp Glu Tyr Leu Pro Val Trp Gly Glu Thr Asp Glu Thr Ser Phe Glu |      |
| 260 265 270 275   |      |
| gca ggc atc aaa gtg cag atc cac agt cag gat gaa ccc cct ttc atc | 981  |
| Ala Gly Ile Lys Val Gln Ile His Ser Gln Asp Glu Pro Pro Phe Ile |      |
| 280 285 290   |      |
| gac cag ctg ggc ttt ggt gtg gct cca ggt ttc cag acg ttt gtg tct | 1029 |
| Asp Gln Leu Gly Phe Gly Val Ala Pro Gly Phe Gln Thr Phe Val Ser |      |
| 295 300 305   |      |
| tgc cag gag cag agg ctc atc tac ctg ccc tca ccc tgg ggc acc tgc | 1077 |
| Cys Gln Glu Gln Arg Leu Ile Tyr Leu Pro Ser Pro Trp Gly Thr Cys |      |
| 310 315 320   |      |
| aat gct gtt acc atg gac tcg gat ttc ttc gac tcc tac agc atc act | 1125 |
| Asn Ala Val Thr Met Asp Ser Asp Phe Phe Asp Ser Tyr Ser Ile Thr |      |
| 325 330 335   |      |
| gcc tgc cgg att gat tgc gag acg cgt tac ctg gtg gag aac tgc aac | 1173 |
| Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Leu Val Glu Asn Cys Asn |      |
| 340 345 350 355   |      |
| tgc cgt atg gtg cac atg cca ggg gac gcc cca tac tgc act cca gag | 1221 |
| Cys Arg Met Val His Met Pro Gly Asp Ala Pro Tyr Cys Thr Pro Glu |      |
| 360 365 370   |      |
| cag tac aag gag tgt gca gat cct gcc ctg gac ttc cta gtg gag aaa | 1269 |
| Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu Asp Phe Leu Val Glu Lys |      |
| 375 380 385   |      |
| gac cag gaa tac tgc gtg tgt gag atg cct tgc aac ctg acc cgc tac | 1317 |
| Asp Gln Glu Tyr Cys Val Cys Glu Met Pro Cys Asn Leu Thr Arg Tyr |      |
| 390 395 400   |      |
| ggc aag gag ctg tcc atg gtc aag atc cca agc aaa gcc tcc gcc aag | 1365 |
| Gly Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Ala Ser Ala Lys |      |
| 405 410 415   |      |
| tac ctg gcc aag aag ttc aac aaa tcg gag cag tac ata ggg gag aac | 1413 |
| Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu Gln Tyr Ile Gly Glu Asn |      |
| 420 425 430 435   |      |
| att ctg gtg ctg gac att ttc ttt gaa gtc ctc aac tat gag acc atc | 1461 |
| Ile Leu Val Leu Asp Ile Phe Phe Glu Val Leu Asn Tyr Glu Thr Ile |      |
| 440 445 450   |      |



|  |      |
|--|------|
| gag cag aaa aag gcc tat gag atc gca ggg ctg ttg ggt gac atc ggg    | 1509 |
| Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly Leu Leu Gly Asp Ile Gly    |      |
| 455 460 465  |      |
| ggc cag atg ggg ttg ttc atc ggt gcc agc atc ctc acc gtg ctg gaa    | 1557 |
| Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr Val Leu Glu    |      |
| 470 475 480  |      |
| ctc ttt gac tat gcc tac gag gtc att aag cac agg ctg tgc aga cgt    | 1605 |
| Leu Phe Asp Tyr Ala Tyr Glu Val Ile Lys His Arg Leu Cys Arg Arg    |      |
| 485 490 495  |      |
| gga aag tgc cag aag gag gct aag agg agc agc gca gac aag ggc gtg    | 1653 |
| Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser Ser Ala Asp Lys Gly Val    |      |
| 500 505 510 515  |      |
| gcg ctc agc ctg gat gac gtc aaa aga cac aat ccc tgc gag agc ctc    | 1701 |
| Ala Leu Ser Leu Asp Asp Val Lys Arg His Asn Pro Cys Glu Ser Leu    |      |
| 520 525 530  |      |
| cga gga cat cct gcc ggg atg acg tac gct gcc aac atc cta cct cac    | 1749 |
| Arg Gly His Pro Ala Gly Met Thr Tyr Ala Ala Asn Ile Leu Pro His    |      |
| 535 540 545  |      |
| cat ccc gct cga ggc acg ttt gag gac ttt acc tgc taagccctcg         | 1795 |
| His Pro Ala Arg Gly Thr Phe Glu Asp Phe Thr Cys                    |      |
| 550 555  |      |
| caggccgctg taccaaaggc ctaggtgggg agggctgggg gagcaagggg cccccaactg  | 1855 |
| ccccagcta ccctgtggac ttaactgcat tcctggtcag tggttccctc ttgtctgtgg   | 1915 |
| tgagaaagga gtcttgacca tagagtcctc tcccagcctc tatcccatct ttttatttta  | 1975 |
| atttaatcac atttgctctg taatattgct tgaggctggg gatcgtgatt tccccccagt  | 2035 |
| tcttttattg ttgagaatag ttttctctat tctgggtttt ctgttatttc aaatgaatct  | 2095 |
| gcaaattgct cttcccatct ctatgaagaa ttgcgttgga attttgatgg ggattgtatt  | 2155 |
| gaatctgtag attgcctttg gtaagatggc catttttact atgttaatcc tgccaattca  | 2215 |
| tgagcaaggg agatctttct atctctgaaa totacttcag tttctttctt cagagacttg  | 2275 |
| aagttcttgt cataaaaaatc tttttgggta gagccacacc aaggtatttt atattgtttg | 2335 |
| tgactattgt gaatggtgtc atttccctaa tttccttctc agcctactta tcctttgagt  | 2395 |
| agaggaaggc ttctgatttg tttgggttaa ttttataccc agctgctttg ctaaagttct  | 2455 |
| ttatcaggtt taggtgttct ctggtggaac ttttggggtc acgtaagaat actattatat  | 2515 |
| catctgcaaa tagtgatatt tcacttcttc ctttccaatt tctatccctc tggggacttt  | 2575 |
| ttgttgctta attgctctgg ctaggacttc aaattctata ttgaatagat agggagagag  | 2635 |
| tgggcagcct tgtctagttc ctggttttctg tgggatcgct tcaaatttct ctccatttag | 2695 |
| tttgatattg gctactgggt tgctgtatat ggcttttact gtacttaggt atgggccttg  | 2755 |
| aattcctgat atttccaaga cttttaacat gaaggggttt tgaaatttgc caaatgcttt  | 2815 |

ctcagcatct aatgagatga tcatgtgccc tccccccacc ttgagtttgt ttatatagtg 2875  
 ggttacatga aaggatcatt tctaatagtc cacaagtctg ccaaattcttg ctgattgtga 2935  
 ctcathttcca tagcaggctc tataacttct ctaacagatt gcattaaact ctgcttgggg 2995  
 aaggcattac ctcttggttg aagcaatggt gtagtttcta tgctgtctga gtaaatagcc 3055  
 tcaagtccaa gtacttgccc agactaatga tcaaacgtat ccaggagttc cataccagag 3115  
 atgtactctt ctctcctttg aagtacattg ctggaagagt aattgtgttt gctagagata 3175  
 ctctttcgaa ctgcaaaaaga aatctcttgg ctaagcatat aatcaagcct caggttttct 3235  
 ttttattaaa tagctgcttg taagaaagtg gacactaagc atatacctca aaggagagaca 3295  
 gaatgactct gtgccttcac tgatggaagt ctgggttaca aattacatca gaagaaccta 3355  
 tcatagtgaac acatctcatt cccctgggtat aatcccttct agaaatacac ttgtgactct 3415  
 gaaatgttat aatcgtgaca actaggctgt tacagataca ccaagttaaa tttgatagag 3475  
 aaaccaggct tggagcctca tgtccatagg gcaagaggaa gatgctgagt gtttaagggt 3535  
 ggtttgagcg aagaacaata ccttgtgtca caaaaatgaa aggaaaaaag aaaaaaggaa 3595  
 agaaggaaag aaagagagag aaagaaaaag aaagaaagaa aaaaaaaaaa aa 3647

<210> 8  
 <211> 559  
 <212> PRT  
 <213> rat

<400> 8

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Pro | Ile | Gln | Ile | Phe | Cys | Ser | Val | Ser | Phe | Ser | Ser | Gly | Glu | Glu |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ala | Pro | Gly | Ser | Met | Ala | Asp | Ile | Trp | Gly | Pro | His | His | His | Arg | Gln |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gln | Gln | Asp | Ser | Ser | Glu | Ser | Glu | Glu | Glu | Glu | Glu | Lys | Glu | Met | Glu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Ala | Gly | Ser | Glu | Leu | Asp | Glu | Gly | Asp | Asp | Ser | Pro | Arg | Asp | Leu | Val |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ala | Phe | Ala | Asn | Ser | Cys | Thr | Phe | His | Gly | Ala | Ser | His | Val | Phe | Val |
|     | 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Glu | Gly | Gly | Pro | Gly | Pro | Arg | Gln | Ala | Leu | Trp | Ala | Val | Ala | Phe | Val |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Ile | Ala | Leu | Gly | Ala | Phe | Leu | Cys | Gln | Val | Gly | Asp | Arg | Val | Ala | Tyr |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Tyr | Leu | Ser | Tyr | Pro | His | Val | Thr | Leu | Leu | Asp | Glu | Val | Ala | Thr | Thr |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Leu | Val | Phe | Pro | Ala | Val | Thr | Phe | Cys | Asn | Thr | Asn | Ala | Val | Arg | 130 | 135 | 140 |
| Leu | Ser | Gln | Leu | Ser | Tyr | Pro | Asp | Leu | Leu | Tyr | Leu | Ala | Pro | Met | Leu | 145 | 150 | 155 |
| Gly | Leu | Asp | Glu | Ser | Asp | Asp | Pro | Gly | Val | Pro | Leu | Ala | Pro | Pro | Gly | 165 | 170 | 175 |
| Pro | Glu | Ala | Phe | Ser | Gly | Glu | Pro | Phe | Asn | Leu | His | Arg | Phe | Tyr | Asn | 180 | 185 | 190 |
| Arg | Ser | Cys | His | Arg | Leu | Glu | Asp | Met | Leu | Leu | Tyr | Cys | Ser | Tyr | Cys | 195 | 200 | 205 |
| Gly | Gly | Pro | Cys | Gly | Pro | His | Asn | Phe | Ser | Val | Val | Phe | Thr | Arg | Tyr | 210 | 215 | 220 |
| Gly | Lys | Cys | Tyr | Thr | Phe | Asn | Ser | Gly | Gln | Asp | Gly | Arg | Pro | Arg | Leu | 225 | 230 | 235 |
| Lys | Thr | Met | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu | Glu | Ile | Met | Leu | Asp | 245 | 250 | 255 |
| Ile | Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Val | Trp | Gly | Glu | Thr | Asp | Glu | Thr | 260 | 265 | 270 |
| Ser | Phe | Glu | Ala | Gly | Ile | Lys | Val | Gln | Ile | His | Ser | Gln | Asp | Glu | Pro | 275 | 280 | 285 |
| Pro | Phe | Ile | Asp | Gln | Leu | Gly | Phe | Gly | Val | Ala | Pro | Gly | Phe | Gln | Thr | 290 | 295 | 300 |
| Phe | Val | Ser | Cys | Gln | Glu | Gln | Arg | Leu | Ile | Tyr | Leu | Pro | Ser | Pro | Trp | 305 | 310 | 315 |
| Gly | Thr | Cys | Asn | Ala | Val | Thr | Met | Asp | Ser | Asp | Phe | Phe | Asp | Ser | Tyr | 325 | 330 | 335 |
| Ser | Ile | Thr | Ala | Cys | Arg | Ile | Asp | Cys | Glu | Thr | Arg | Tyr | Leu | Val | Glu | 340 | 345 | 350 |
| Asn | Cys | Asn | Cys | Arg | Met | Val | His | Met | Pro | Gly | Asp | Ala | Pro | Tyr | Cys | 355 | 360 | 365 |
| Thr | Pro | Glu | Gln | Tyr | Lys | Glu | Cys | Ala | Asp | Pro | Ala | Leu | Asp | Phe | Leu | 370 | 375 | 380 |
| Val | Glu | Lys | Asp | Gln | Glu | Tyr | Cys | Val | Cys | Glu | Met | Pro | Cys | Asn | Leu | 385 | 390 | 395 |
| Thr | Arg | Tyr | Gly | Lys | Glu | Leu | Ser | Met | Val | Lys | Ile | Pro | Ser | Lys | Ala | 405 | 410 | 415 |
| Ser | Ala | Lys | Tyr | Leu | Ala | Lys | Lys | Phe | Asn | Lys | Ser | Glu | Gln | Tyr | Ile | 420 | 425 | 430 |
| Gly | Glu | Asn | Ile | Leu | Val | Leu | Asp | Ile | Phe | Phe | Glu | Val | Leu | Asn | Tyr | 435 | 440 | 445 |

Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly Leu Leu Gly  
 450 455 460  
 Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr  
 465 470 475 480  
 Val Leu Glu Leu Phe Asp Tyr Ala Tyr Glu Val Ile Lys His Arg Leu  
 485 490 495  
 Cys Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser Ser Ala Asp  
 500 505 510  
 Lys Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His Asn Pro Cys  
 515 520 525  
 Glu Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala Ala Asn Ile  
 530 535 540  
 Leu Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe Thr Cys  
 545 550 555

<210> 9  
 <211> 1602  
 <212> DNA  
 <213> rat

<220>  
 <221> CDS  
 <222> (1)..(1599)

<400> 9  
 atg aaa cct cgc tcc gga ctg gag gag gcc cag cgg cga cag gcc tca 48  
 Met Lys Pro Arg Ser Gly Leu Glu Glu Ala Gln Arg Arg Gln Ala Ser  
 1 5 10 15  
 gac atc cgg gtg ttt gcc agc agc tgc aca atg cat ggt ctg ggc cac 96  
 Asp Ile Arg Val Phe Ala Ser Ser Cys Thr Met His Gly Leu Gly His  
 20 25 30  
 atc ttt ggc cct gga ggc ctg acc ctg cgc cga ggg ctg tgg gcc aca 144  
 Ile Phe Gly Pro Gly Gly Leu Thr Leu Arg Arg Gly Leu Trp Ala Thr  
 35 40 45  
 gct gtg ctc ctg tcg ctg gcg gcc ttc ctc tac cag gtg gct gag cgg 192  
 Ala Val Leu Leu Ser Leu Ala Ala Phe Leu Tyr Gln Val Ala Glu Arg  
 50 55 60  
 gtt cgc tac tat ggg gag ttc cac cat aag acc acc ctg gat gag cgt 240  
 Val Arg Tyr Tyr Gly Glu Phe His His Lys Thr Thr Leu Asp Glu Arg  
 65 70 75 80  
 gag agc cac cag ctc acc ttc cca gct gtg act ctg tgt aat atc aac 288  
 Glu Ser His Gln Leu Thr Phe Pro Ala Val Thr Leu Cys Asn Ile Asn  
 85 90 95  
 cca ctg cgc cgc tca cgc ctc aca ccc aat gac ttg cac tgg gct gga 336  
 Pro Leu Arg Arg Ser Arg Leu Thr Pro Asn Asp Leu His Trp Ala Gly  
 100 105 110

|   |      |
|---|------|
| aca gcg ctg ctg ggc ctg gac cct gct gaa cat gct gcc tac ctt cgt | 384  |
| Thr Ala Leu Leu Gly Leu Asp Pro Ala Glu His Ala Ala Tyr Leu Arg |      |
| 115 120 125   |      |
| gca ctg ggc cag ccc ccc gca cca cct ggc ttc atg ccc agt ccg acc | 432  |
| Ala Leu Gly Gln Pro Pro Ala Pro Pro Gly Phe Met Pro Ser Pro Thr |      |
| 130 135 140   |      |
| ttt gac atg gca caa ctc tac gcc aga gcc ggc cac tcc ctt gag gac | 480  |
| Phe Asp Met Ala Gln Leu Tyr Ala Arg Ala Gly His Ser Leu Glu Asp |      |
| 145 150 155 160   |      |
| atg ttg ttg gat tgc cga tac cgt ggc cag ccc tgt ggg cct gag aac | 528  |
| Met Leu Leu Asp Cys Arg Tyr Arg Gly Gln Pro Cys Gly Pro Glu Asn |      |
| 165 170 175   |      |
| ttc aca gtg atc ttt act cga atg ggg caa tgc tac acc ttc aac tct | 576  |
| Phe Thr Val Ile Phe Thr Arg Met Gly Gln Cys Tyr Thr Phe Asn Ser |      |
| 180 185 190   |      |
| ggt gcc cac ggt gca gag ctg ctc acc act cca aag ggt ggt gct ggc | 624  |
| Gly Ala His Gly Ala Glu Leu Leu Thr Thr Pro Lys Gly Gly Ala Gly |      |
| 195 200 205   |      |
| aac gga ctg gag att atg cta gat gta cag caa gag gag tat ctg ccc | 672  |
| Asn Gly Leu Glu Ile Met Leu Asp Val Gln Gln Glu Glu Tyr Leu Pro |      |
| 210 215 220   |      |
| atc tgg aag gac atg gaa gag acc ccg ttt gag gtg ggg atc cga gtg | 720  |
| Ile Trp Lys Asp Met Glu Glu Thr Pro Phe Glu Val Gly Ile Arg Val |      |
| 225 230 235 240   |      |
| cag att cac agc cag gat gag ccc cct gcc att gac cag ctg ggc ttc | 768  |
| Gln Ile His Ser Gln Asp Glu Pro Pro Ala Ile Asp Gln Leu Gly Phe |      |
| 245 250 255   |      |
| ggg gca gcc cca ggc cat cag act ttt gtg tcc tgt cag cag cag caa | 816  |
| Gly Ala Ala Pro Gly His Gln Thr Phe Val Ser Cys Gln Gln Gln Gln |      |
| 260 265 270   |      |
| ctg agt ttc ctg cca cca ccc tgg ggt gac tgc aat acc gca tct ttg | 864  |
| Leu Ser Phe Leu Pro Pro Pro Trp Gly Asp Cys Asn Thr Ala Ser Leu |      |
| 275 280 285   |      |
| gat ccc gac gac ttt gat cca gag ccc tct gat ccc ttg ggt tcc ccc | 912  |
| Asp Pro Asp Asp Phe Asp Pro Glu Pro Ser Asp Pro Leu Gly Ser Pro |      |
| 290 295 300   |      |
| aga ccc aga ccc agc cct cct tat agt tta ata ggt tgt cgc ctg gcc | 960  |
| Arg Pro Arg Pro Ser Pro Pro Tyr Ser Leu Ile Gly Cys Arg Leu Ala |      |
| 305 310 315 320   |      |
| tgt gag tct cgc tat gtg gct cgg aag tgt ggc tgt cga atg atg cat | 1008 |
| Cys Glu Ser Arg Tyr Val Ala Arg Lys Cys Gly Cys Arg Met Met His |      |
| 325 330 335   |      |
| atg cct gga aac tcc cca gtg tgc agc ccc cag cag tac aag gac tgc | 1056 |
| Met Pro Gly Asn Ser Pro Val Cys Ser Pro Gln Gln Tyr Lys Asp Cys |      |
| 340 345 350   |      |

gcc agc cca gct ctg gac gct atg ctg cga aag gac acg tgt gtc tgc 1104  
 Ala Ser Pro Ala Leu Asp Ala Met Leu Arg Lys Asp Thr Cys Val Cys  
 355 360 365  
  
 ccc aac ccg tgc gct act aca cgc tat gcc aag gag ctc tcc atg gtg 1152  
 Pro Asn Pro Cys Ala Thr Thr Arg Tyr Ala Lys Glu Leu Ser Met Val  
 370 375 380  
  
 cgg att ccc agc cgc gcg tca gct cgc tac ctg gcc cgg aaa tac aac 1200  
 Arg Ile Pro Ser Arg Ala Ser Ala Arg Tyr Leu Ala Arg Lys Tyr Asn  
 385 390 395 400  
  
 cgc agc gag tcc tac att acg gag aat gta ctg gtt ctg gat atc ttc 1248  
 Arg Ser Glu Ser Tyr Ile Thr Glu Asn Val Leu Val Leu Asp Ile Phe  
 405 410 415  
  
 ttt gag gcc ctc aac tat gaa gcg gtg gaa caa aag gcg gcc tat gaa 1296  
 Phe Glu Ala Leu Asn Tyr Glu Ala Val Glu Gln Lys Ala Ala Tyr Glu  
 420 425 430  
  
 gtg tcg gag ctg ctg gga gac att ggg gga cag atg gga ctg ttt att 1344  
 Val Ser Glu Leu Leu Gly Asp Ile Gly Gly Gln Met Gly Leu Phe Ile  
 435 440 445  
  
 gga gca agc ctg ctt acc atc ctt gag atc ctc gac tat ctc tgt gag 1392  
 Gly Ala Ser Leu Leu Thr Ile Leu Glu Ile Leu Asp Tyr Leu Cys Glu  
 450 455 460  
  
 gtt ttc caa gac aga gtc ctg ggg tat ttc tgg aac aga agg agc gct 1440  
 Val Phe Gln Asp Arg Val Leu Gly Tyr Phe Trp Asn Arg Arg Ser Ala  
 465 470 475 480  
  
 caa aag cgc tct ggc aac act ctg ctc cag gaa gag ttg aat ggc cat 1488  
 Gln Lys Arg Ser Gly Asn Thr Leu Leu Gln Glu Glu Leu Asn Gly His  
 485 490 495  
  
 cga aca cat gtt ccc cac ctc agc cta ggg ccc agg cct cct acc act 1536  
 Arg Thr His Val Pro His Leu Ser Leu Gly Pro Arg Pro Pro Thr Thr  
 500 505 510  
  
 ccc tgt gct gtc acc aag aca ctc tct gcc tcc cac cgt acc tgt tac 1584  
 Pro Cys Ala Val Thr Lys Thr Leu Ser Ala Ser His Arg Thr Cys Tyr  
 515 520 525  
  
 ctc gtc aca agg ctc tag 1602  
 Leu Val Thr Arg Leu  
 530

<210> 10  
 <211> 533  
 <212> PRT  
 <213> rat

<400> 10  
 Met Lys Pro Arg Ser Gly Leu Glu Glu Ala Gln Arg Arg Gln Ala Ser  
 1 5 10 15  
 Asp Ile Arg Val Phe Ala Ser Ser Cys Thr Met His Gly Leu Gly His  
 20 25 30

Ile Phe Gly Pro Gly Gly Leu Thr Leu Arg Arg Gly Leu Trp Ala Thr  
 35 40 45  
 Ala Val Leu Leu Ser Leu Ala Ala Phe Leu Tyr Gln Val Ala Glu Arg  
 50 55 60  
 Val Arg Tyr Tyr Gly Glu Phe His His Lys Thr Thr Leu Asp Glu Arg  
 65 70 75 80  
 Glu Ser His Gln Leu Thr Phe Pro Ala Val Thr Leu Cys Asn Ile Asn  
 85 90 95  
 Pro Leu Arg Arg Ser Arg Leu Thr Pro Asn Asp Leu His Trp Ala Gly  
 100 105 110  
 Thr Ala Leu Leu Gly Leu Asp Pro Ala Glu His Ala Ala Tyr Leu Arg  
 115 120 125  
 Ala Leu Gly Gln Pro Pro Ala Pro Pro Gly Phe Met Pro Ser Pro Thr  
 130 135 140  
 Phe Asp Met Ala Gln Leu Tyr Ala Arg Ala Gly His Ser Leu Glu Asp  
 145 150 155 160  
 Met Leu Leu Asp Cys Arg Tyr Arg Gly Gln Pro Cys Gly Pro Glu Asn  
 165 170 175  
 Phe Thr Val Ile Phe Thr Arg Met Gly Gln Cys Tyr Thr Phe Asn Ser  
 180 185 190  
 Gly Ala His Gly Ala Glu Leu Leu Thr Thr Pro Lys Gly Gly Ala Gly  
 195 200 205  
 Asn Gly Leu Glu Ile Met Leu Asp Val Gln Gln Glu Glu Tyr Leu Pro  
 210 215 220  
 Ile Trp Lys Asp Met Glu Glu Thr Pro Phe Glu Val Gly Ile Arg Val  
 225 230 235 240  
 Gln Ile His Ser Gln Asp Glu Pro Pro Ala Ile Asp Gln Leu Gly Phe  
 245 250 255  
 Gly Ala Ala Pro Gly His Gln Thr Phe Val Ser Cys Gln Gln Gln Gln  
 260 265 270  
 Leu Ser Phe Leu Pro Pro Pro Trp Gly Asp Cys Asn Thr Ala Ser Leu  
 275 280 285  
 Asp Pro Asp Asp Phe Asp Pro Glu Pro Ser Asp Pro Leu Gly Ser Pro  
 290 295 300  
 Arg Pro Arg Pro Ser Pro Pro Tyr Ser Leu Ile Gly Cys Arg Leu Ala  
 305 310 315 320  
 Cys Glu Ser Arg Tyr Val Ala Arg Lys Cys Gly Cys Arg Met Met His  
 325 330 335  
 Met Pro Gly Asn Ser Pro Val Cys Ser Pro Gln Gln Tyr Lys Asp Cys  
 340 345 350

Ala Ser Pro Ala Leu Asp Ala Met Leu Arg Lys Asp Thr Cys Val Cys  
 355 360 365

Pro Asn Pro Cys Ala Thr Thr Arg Tyr Ala Lys Glu Leu Ser Met Val  
 370 375 380

Arg Ile Pro Ser Arg Ala Ser Ala Arg Tyr Leu Ala Arg Lys Tyr Asn  
 385 390 395 400

Arg Ser Glu Ser Tyr Ile Thr Glu Asn Val Leu Val Leu Asp Ile Phe  
 405 410 415

Phe Glu Ala Leu Asn Tyr Glu Ala Val Glu Gln Lys Ala Ala Tyr Glu  
 420 425 430

Val Ser Glu Leu Leu Gly Asp Ile Gly Gly Gln Met Gly Leu Phe Ile  
 435 440 445

Gly Ala Ser Leu Leu Thr Ile Leu Glu Ile Leu Asp Tyr Leu Cys Glu  
 450 455 460

Val Phe Gln Asp Arg Val Leu Gly Tyr Phe Trp Asn Arg Arg Ser Ala  
 465 470 475 480

Gln Lys Arg Ser Gly Asn Thr Leu Leu Gln Glu Glu Leu Asn Gly His  
 485 490 495

Arg Thr His Val Pro His Leu Ser Leu Gly Pro Arg Pro Pro Thr Thr  
 500 505 510

Pro Cys Ala Val Thr Lys Thr Leu Ser Ala Ser His Arg Thr Cys Tyr  
 515 520 525

Leu Val Thr Arg Leu  
 530

<210> 11  
 <211> 1948  
 <212> DNA  
 <213> rat

<220>  
 <221> CDS  
 <222> (16)..(1704)

<400> 11  
 cctcgggctg aatga atg agc cgg agc ggc gga gcc cgg ctg ccc gcg acc 51  
 Met Ser Arg Ser Gly Gly Ala Arg Leu Pro Ala Thr  
 1 5 10

gcg ctc agc ggc ccg gga cgc ttc cgt atg gcc cgc gag cag ccg gcg 99  
 Ala Leu Ser Gly Pro Gly Arg Phe Arg Met Ala Arg Glu Gln Pro Ala  
 15 20 25

ccc gtg gcg gtg gcg gca gct agg cag ccc gga gga gac cgg agc ggc 147  
 Pro Val Ala Val Ala Ala Arg Gln Pro Gly Gly Asp Arg Ser Gly  
 30 35 40



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gat | ccg | gcg | ctg | cag | ggg | cca | ggg | gtc | gcc | cgc | agg | ggg | cgg | ccg | tcc | 195 |
| Asp | Pro | Ala | Leu | Gln | Gly | Pro | Gly | Val | Ala | Arg | Arg | Gly | Arg | Pro | Ser |     |
| 45  |     |     |     |     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |
| ctg | agt | cgc | act | aaa | ttg | cac | ggg | ctg | cgg | cac | atg | tgc | gcg | ggg | cgc | 243 |
| Leu | Ser | Arg | Thr | Lys | Leu | His | Gly | Leu | Arg | His | Met | Cys | Ala | Gly | Arg |     |
|     |     |     |     | 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |
| acg | gcg | gcg | gga | ggc | tct | ttc | cag | cga | cgg | gcg | ctg | tgg | gtg | ctg | gcc | 291 |
| Thr | Ala | Ala | Gly | Gly | Ser | Phe | Gln | Arg | Arg | Ala | Leu | Trp | Val | Leu | Ala |     |
|     |     |     | 80  |     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |
| ttc | tgc | acg | tcc | ctc | ggc | ttg | ctg | ctg | tcc | tgg | tcc | tcg | aac | cgc | ctg | 339 |
| Phe | Cys | Thr | Ser | Leu | Gly | Leu | Leu | Leu | Ser | Trp | Ser | Ser | Asn | Arg | Leu |     |
|     |     | 95  |     |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     |
| ctc | tac | tgg | ctc | agc | ttc | ccg | tca | cac | aca | cga | gtg | cac | cgt | gag | tgg | 387 |
| Leu | Tyr | Trp | Leu | Ser | Phe | Pro | Ser | His | Thr | Arg | Val | His | Arg | Glu | Trp |     |
|     | 110 |     |     |     |     | 115 |     |     |     |     | 120 |     |     |     |     |     |
| agc | cgc | cag | ctg | ccg | ttc | ccc | gcc | gtc | acc | gtg | tgc | aac | aac | aac | ccc | 435 |
| Ser | Arg | Gln | Leu | Pro | Phe | Pro | Ala | Val | Thr | Val | Cys | Asn | Asn | Asn | Pro |     |
| 125 |     |     |     |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |
| ctg | cgc | ttc | ccg | cgc | ctc | tcc | aag | ggg | gac | ctc | tac | tac | gcg | ggc | cac | 483 |
| Leu | Arg | Phe | Pro | Arg | Leu | Ser | Lys | Gly | Asp | Leu | Tyr | Tyr | Ala | Gly | His |     |
|     |     |     |     | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |
| tgg | cta | ggg | ctg | ctg | ctt | ccc | aac | cgc | acc | gcg | cgc | ccg | ctg | gtc | agc | 531 |
| Trp | Leu | Gly | Leu | Leu | Leu | Pro | Asn | Arg | Thr | Ala | Arg | Pro | Leu | Val | Ser |     |
|     |     |     | 160 |     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |
| gag | ctg | ctg | cgg | ggc | gac | gag | ccg | cgc | cgc | cag | tgg | ttc | cgc | aaa | ctg | 579 |
| Glu | Leu | Leu | Arg | Gly | Asp | Glu | Pro | Arg | Arg | Gln | Trp | Phe | Arg | Lys | Leu |     |
|     |     | 175 |     |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     |
| gcc | gac | ttc | cgc | ctc | ttc | ctg | ccg | ccg | cgc | cac | ttc | gag | ggc | atc | agc | 627 |
| Ala | Asp | Phe | Arg | Leu | Phe | Leu | Pro | Pro | Arg | His | Phe | Glu | Gly | Ile | Ser |     |
|     | 190 |     |     |     |     | 195 |     |     |     |     | 200 |     |     |     |     |     |
| gct | gcc | ttc | atg | gac | cgt | ttg | ggc | cac | cag | ctg | gag | gat | atg | ctg | ctc | 675 |
| Ala | Ala | Phe | Met | Asp | Arg | Leu | Gly | His | Gln | Leu | Glu | Asp | Met | Leu | Leu |     |
| 205 |     |     |     |     | 210 |     |     |     |     | 215 |     |     |     | 220 |     |     |
| tcc | tgc | aag | tac | cgg | ggc | gag | ctc | tgt | ggc | ccg | cac | aac | ttc | tcc | tca | 723 |
| Ser | Cys | Lys | Tyr | Arg | Gly | Glu | Leu | Cys | Gly | Pro | His | Asn | Phe | Ser | Ser |     |
|     |     |     |     | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |
| gtg | ttt | aca | aaa | tac | ggg | aag | tgt | tac | atg | ttt | aac | tca | ggc | gag | gat | 771 |
| Val | Phe | Thr | Lys | Tyr | Gly | Lys | Cys | Tyr | Met | Phe | Asn | Ser | Gly | Glu | Asp |     |
|     |     |     | 240 |     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |
| ggc | aag | ccg | ctg | ctc | acc | acg | gtc | aag | ggg | ggg | acg | ggc | aac | ggg | ctg | 819 |
| Gly | Lys | Pro | Leu | Leu | Thr | Thr | Val | Lys | Gly | Gly | Thr | Gly | Asn | Gly | Leu |     |
|     |     | 255 |     |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     |
| gag | atc | atg | ctg | gac | att | cag | caa | gat | gag | tac | ctg | ccc | atc | tgg | gga | 867 |
| Glu | Ile | Met | Leu | Asp | Ile | Gln | Gln | Asp | Glu | Tyr | Leu | Pro | Ile | Trp | Gly |     |
|     | 270 |     |     |     |     | 275 |     |     |     |     | 280 |     |     |     |     |     |

|                   |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                   |      |
|-------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------------|------|
| gag<br>Glu<br>285 | aca<br>Thr | gag<br>Glu | gaa<br>Glu | aca<br>Thr | acg<br>Thr | ttt<br>Phe | gaa<br>Glu | gca<br>Ala | gga<br>Gly | gtg<br>Val | aag<br>Lys | gtt<br>Val | cag<br>Gln | atc<br>Ile | cac<br>His<br>300 | 915  |
| agt<br>Ser        | cag<br>Gln | tct<br>Ser | gag<br>Glu | ccg<br>Pro | cct<br>Pro | ttc<br>Phe | atc<br>Ile | caa<br>Gln | gag<br>Glu | ctg<br>Leu | ggc<br>Gly | ttt<br>Phe | ggg<br>Gly | gtg<br>Val | gct<br>Ala<br>315 | 963  |
| ccg<br>Pro        | ggg<br>Gly | ttc<br>Phe | cag<br>Gln | acc<br>Thr | ttc<br>Phe | gtg<br>Val | gcc<br>Ala | aca<br>Thr | caa<br>Gln | gag<br>Glu | cag<br>Gln | agg<br>Arg | ctc<br>Leu | aca<br>Thr | tat<br>Tyr        | 1011 |
| ctg<br>Leu        | ccc<br>Pro | cca<br>Pro | cca<br>Pro | tgg<br>Trp | ggg<br>Gly | gag<br>Glu | tgc<br>Cys | cgg<br>Arg | tcc<br>Ser | tca<br>Ser | gag<br>Glu | atg<br>Met | gga<br>Gly | ctc<br>Leu | gac<br>Asp        | 1059 |
| ttc<br>Phe<br>350 | ttt<br>Phe | cct<br>Pro | gtt<br>Val | tac<br>Tyr | agc<br>Ser | atc<br>Ile | aca<br>Thr | gcc<br>Ala | tgt<br>Cys | cgg<br>Arg | att<br>Ile | gac<br>Asp | tgt<br>Cys | gag<br>Glu | acc<br>Thr        | 1107 |
| cgc<br>Arg<br>365 | tac<br>Tyr | atc<br>Ile | gtg<br>Val | gag<br>Glu | aac<br>Asn | tgt<br>Cys | aac<br>Asn | tgc<br>Cys | cgc<br>Arg | atg<br>Met | gtc<br>Val | cac<br>His | atg<br>Met | cca<br>Pro | ggg<br>Gly<br>380 | 1155 |
| gac<br>Asp        | gcc<br>Ala | cct<br>Pro | ttc<br>Phe | tgc<br>Cys | acc<br>Thr | cct<br>Pro | gag<br>Glu | cag<br>Gln | cac<br>His | aag<br>Lys | gag<br>Glu | tgt<br>Cys | gca<br>Ala | gag<br>Glu | cct<br>Pro<br>395 | 1203 |
| gcc<br>Ala        | ctc<br>Leu | ggt<br>Gly | cta<br>Leu | ctg<br>Leu | gca<br>Ala | gaa<br>Glu | aag<br>Lys | gac<br>Asp | agc<br>Ser | aat<br>Asn | tac<br>Tyr | tgt<br>Cys | ctc<br>Leu | tgc<br>Cys | agg<br>Arg        | 1251 |
| aca<br>Thr        | ccc<br>Pro | tgc<br>Cys | aac<br>Asn | ctg<br>Leu | aca<br>Thr | cgc<br>Arg | tac<br>Tyr | aac<br>Asn | aaa<br>Lys | gag<br>Glu | ctc<br>Leu | tcc<br>Ser | atg<br>Met | gtg<br>Val | aag<br>Lys        | 1299 |
| atc<br>Ile<br>430 | ccc<br>Pro | agc<br>Ser | aag<br>Lys | acg<br>Thr | tca<br>Ser | gcc<br>Ala | aag<br>Lys | tac<br>Tyr | tta<br>Leu | gag<br>Glu | aag<br>Lys | aaa<br>Lys | ttt<br>Phe | aac<br>Asn | aaa<br>Lys        | 1347 |
| tcg<br>Ser<br>445 | gaa<br>Glu | aaa<br>Lys | tat<br>Tyr | atc<br>Ile | tca<br>Ser | gag<br>Glu | aac<br>Asn | att<br>Ile | ctt<br>Leu | gtt<br>Val | ctg<br>Leu | gac<br>Asp | ata<br>Ile | ttt<br>Phe | ttt<br>Phe<br>460 | 1395 |
| gag<br>Glu        | gcg<br>Ala | ctc<br>Leu | aat<br>Asn | tac<br>Tyr | gaa<br>Glu | aca<br>Thr | att<br>Ile | gaa<br>Glu | cag<br>Gln | aag<br>Lys | aag<br>Lys | gcg<br>Ala | tat<br>Tyr | gaa<br>Glu | gtt<br>Val        | 1443 |
| gct<br>Ala        | gcc<br>Ala | tta<br>Leu | ctt<br>Leu | ggt<br>Gly | gac<br>Asp | atc<br>Ile | ggt<br>Gly | ggt<br>Gly | cag<br>Gln | atg<br>Met | gga<br>Gly | ctg<br>Leu | ttc<br>Phe | att<br>Ile | ggt<br>Gly        | 1491 |
| gct<br>Ala        | agt<br>Ser | ctc<br>Leu | ctc<br>Leu | aca<br>Thr | ata<br>Ile | cta<br>Leu | gag<br>Glu | ctc<br>Leu | ttt<br>Phe | gat<br>Asp | tat<br>Tyr | att<br>Ile | tat<br>Tyr | gag<br>Glu | ctg<br>Leu        | 1539 |
| atc<br>Ile<br>510 | aaa<br>Lys | gag<br>Glu | aag<br>Lys | cta<br>Leu | tta<br>Leu | gac<br>Asp | ctg<br>Leu | ctt<br>Leu | ggc<br>Gly | aaa<br>Lys | gaa<br>Glu | gaa<br>Glu | gag<br>Glu | gaa<br>Glu | ggg<br>Gly        | 1587 |

agc cac gat gag aac atg agc acc tgt gac aca atg cca aac cac tct 1635  
 Ser His Asp Glu Asn Met Ser Thr Cys Asp Thr Met Pro Asn His Ser  
 525 530 535 540

gaa acc atc agc cac act gtg aac gtg ccc ctg cag aca gct ttg ggc 1683  
 Glu Thr Ile Ser His Thr Val Asn Val Pro Leu Gln Thr Ala Leu Gly  
 545 550 555

acc ctg gag gag att gcc tgc tgacacctct caggcaacgc agcacctcca 1734  
 Thr Leu Glu Glu Ile Ala Cys  
 560

aacagacctt aaaggcccaa gacctaggac aggagacagc aagcgcaggt gggatcgccc 1794

ctgacgactg aaagaagcag agccccccat atgcacacat tgcgaacttc tgccaaacct 1854

cacctggcca catctgacat gaaccgtccc gggccctgcg tcatgtccct cgcaggaccg 1914

atgagtcgca ctccggaact gtccaagaac taac 1948

<210> 12  
 <211> 563  
 <212> PRT  
 <213> rat

<400> 12

Met Ser Arg Ser Gly Gly Ala Arg Leu Pro Ala Thr Ala Leu Ser Gly  
 1 5 10 15

Pro Gly Arg Phe Arg Met Ala Arg Glu Gln Pro Ala Pro Val Ala Val  
 20 25 30

Ala Ala Ala Arg Gln Pro Gly Gly Asp Arg Ser Gly Asp Pro Ala Leu  
 35 40 45

Gln Gly Pro Gly Val Ala Arg Arg Gly Arg Pro Ser Leu Ser Arg Thr  
 50 55 60

Lys Leu His Gly Leu Arg His Met Cys Ala Gly Arg Thr Ala Ala Gly  
 65 70 75 80

Gly Ser Phe Gln Arg Arg Ala Leu Trp Val Leu Ala Phe Cys Thr Ser  
 85 90 95

Leu Gly Leu Leu Leu Ser Trp Ser Ser Asn Arg Leu Leu Tyr Trp Leu  
 100 105 110

Ser Phe Pro Ser His Thr Arg Val His Arg Glu Trp Ser Arg Gln Leu  
 115 120 125

Pro Phe Pro Ala Val Thr Val Cys Asn Asn Asn Pro Leu Arg Phe Pro  
 130 135 140

Arg Leu Ser Lys Gly Asp Leu Tyr Tyr Ala Gly His Trp Leu Gly Leu  
 145 150 155 160

Leu Leu Pro Asn Arg Thr Ala Arg Pro Leu Val Ser Glu Leu Leu Arg  
 165 170 175

Gly Asp Glu Pro Arg Arg Gln Trp Phe Arg Lys Leu Ala Asp Phe Arg  
 180 185 190  
 Leu Phe Leu Pro Pro Arg His Phe Glu Gly Ile Ser Ala Ala Phe Met  
 195 200 205  
 Asp Arg Leu Gly His Gln Leu Glu Asp Met Leu Leu Ser Cys Lys Tyr  
 210 215 220  
 Arg Gly Glu Leu Cys Gly Pro His Asn Phe Ser Ser Val Phe Thr Lys  
 225 230 235 240  
 Tyr Gly Lys Cys Tyr Met Phe Asn Ser Gly Glu Asp Gly Lys Pro Leu  
 245 250 255  
 Leu Thr Thr Val Lys Gly Gly Thr Gly Asn Gly Leu Glu Ile Met Leu  
 260 265 270  
 Asp Ile Gln Gln Asp Glu Tyr Leu Pro Ile Trp Gly Glu Thr Glu Glu  
 275 280 285  
 Thr Thr Phe Glu Ala Gly Val Lys Val Gln Ile His Ser Gln Ser Glu  
 290 295 300  
 Pro Pro Phe Ile Gln Glu Leu Gly Phe Gly Val Ala Pro Gly Phe Gln  
 305 310 315 320  
 Thr Phe Val Ala Thr Gln Glu Gln Arg Leu Thr Tyr Leu Pro Pro Pro  
 325 330 335  
 Trp Gly Glu Cys Arg Ser Ser Glu Met Gly Leu Asp Phe Phe Pro Val  
 340 345 350  
 Tyr Ser Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Ile Val  
 355 360 365  
 Glu Asn Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Phe  
 370 375 380  
 Cys Thr Pro Glu Gln His Lys Glu Cys Ala Glu Pro Ala Leu Gly Leu  
 385 390 395 400  
 Leu Ala Glu Lys Asp Ser Asn Tyr Cys Leu Cys Arg Thr Pro Cys Asn  
 405 410 415  
 Leu Thr Arg Tyr Asn Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys  
 420 425 430  
 Thr Ser Ala Lys Tyr Leu Glu Lys Lys Phe Asn Lys Ser Glu Lys Tyr  
 435 440 445  
 Ile Ser Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Ala Leu Asn  
 450 455 460  
 Tyr Glu Thr Ile Glu Gln Lys Lys Ala Tyr Glu Val Ala Ala Leu Leu  
 465 470 475 480  
 Gly Asp Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Leu Leu  
 485 490 495

Thr Ile Leu Glu Leu Phe Asp Tyr Ile Tyr Glu Leu Ile Lys Glu Lys  
500 505 510

Leu Leu Asp Leu Leu Gly Lys Glu Glu Glu Gly Ser His Asp Glu  
515 520 525

Asn Met Ser Thr Cys Asp Thr Met Pro Asn His Ser Glu Thr Ile Ser  
530 535 540

His Thr Val Asn Val Pro Leu Gln Thr Ala Leu Gly Thr Leu Glu Glu  
545 550 555 560

Ile Ala Cys

<210> 13  
<211> 625  
<212> PRT  
<213> Helix aspersa

<400> 13  
Met Lys Tyr Thr Ser Ala Ala Thr Lys Pro Gly Val Phe Pro Glu His  
1 5 10 15

His Gln His Ala Met Met Arg Asn Arg Tyr His Pro His His Cys Asn  
20 25 30

Tyr Ser Asp Asn Arg Ser Ala Ile Asp Ile Ile Ala Glu Leu Gly Ser  
35 40 45

Glu Ser Asn Ala His Gly Leu Ala Lys Ile Val Thr Ser Arg Asp Thr  
50 55 60

Lys Arg Lys Val Ile Trp Ala Leu Leu Val Ile Ala Gly Phe Thr Ala  
65 70 75 80

Ala Thr Leu Gln Leu Ser Leu Leu Val Arg Lys Tyr Leu Gln Phe Gln  
85 90 95

Val Val Glu Leu Ser Glu Ile Lys Asp Ser Met Pro Val Gln Tyr Pro  
100 105 110

Ser Val Ser Ile Cys Asn Ile Glu Pro Ile Ser Leu Arg Thr Ile Arg  
115 120 125

Arg Met Tyr Phe Asn Asn Glu Ser Gln Asn Leu Ile Thr Trp Leu Arg  
130 135 140

Phe Ile Gln Lys Phe Arg Phe Glu Gln Asp Ser Phe Met Asn Ser Ile  
145 150 155 160

Arg Ala Phe Tyr Glu Asn Leu Gly Gln Asp Ala Lys Lys Leu Ser His  
165 170 175

Asn Leu Glu Asp Met Leu Met His Cys Arg Phe Asn Arg Glu Leu Cys  
180 185 190

His Val Ser Asn Phe Ser Thr Phe Phe Asp Gly Asn Tyr Phe Asn Cys  
195 200 205

|            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe<br>210 | Thr | Phe | Asn | Ser | Gly | Gln | Arg | Leu | Gln | Met | His | Ala | Thr | Gly | Pro |
| Glu<br>225 | Asn | Gly | Leu | Ser | Leu | Ile | Phe | Ser | Val | Glu | Lys | Asp | Asp | Pro | Leu |
| Pro        | Gly | Thr | Tyr | Gly | Val | Tyr | Asn | Phe | Asp | Asn | Asn | Ile | Leu | His | Ser |
| Ala        | Gly | Val | Arg | Val | Val | Val | His | Ala | Pro | Gly | Ser | Met | Pro | Ser | Pro |
| Val        | Asp | His | Gly | Ile | Asp | Ile | Pro | Pro | Gly | Tyr | Ser | Ser | Ser | Val | Gly |
| Leu        | Lys | Ala | Ile | Leu | His | Thr | Arg | Leu | Pro | Tyr | Pro | Tyr | Gly | Asn | Cys |
| Thr        | Asn | Asp | Met | Leu | Asn | Gly | Ile | Lys | Gln | Tyr | Lys | Tyr | Thr | Phe | Phe |
| Ala        | Cys | Leu | Gln | Leu | Cys | Lys | Gln | Arg | Leu | Ile | Ile | Gln | Arg | Cys | Gly |
| Cys        | Lys | Ser | Ser | Ala | Leu | Pro | Glu | Val | Pro | Ser | Tyr | Asn | Ala | Thr | Phe |
| Cys        | Gly | Val | Ile | Lys | Asp | Trp | Gln | Glu | Ile | Asn | Arg | Asn | His | Ser | Asn |
| Glu        | Asp | His | Asn | Gln | Ser | Glu | Glu | Asp | Arg | Ala | Phe | Ile | Pro | Thr | Pro |
| Tyr        | Leu | Ala | Cys | Glu | Glu | Arg | Glu | Gln | Lys | Asn | Leu | Asn | Asn | Asp | Arg |
| Thr        | Tyr | Glu | Leu | Ser | Cys | Gly | Cys | Phe | Gln | Pro | Cys | Ser | Glu | Thr | Ser |
| Tyr        | Leu | Lys | Ser | Val | Ser | Leu | Ser | Tyr | Trp | Pro | Leu | Glu | Phe | Tyr | Gln |
| Leu        | Ser | Ala | Val | Glu | Arg | Phe | Phe | Lys | Gln | Glu | Arg | Gln | Ala | Gly | Gln |
| Asn        | His | Phe | Met | Lys | Thr | Ala | Tyr | Glu | Tyr | Leu | Glu | Lys | Leu | Ala | His |
| Pro        | Ser | Gln | Lys | His | Leu | Ala | Arg | Asn | Asp | Ser | His | Met | Asp | Asp | Ile |
| Leu        | Ser | Lys | Ser | Tyr | Ser | Leu | Ser | Glu | Lys | Glu | Met | Ala | Lys | Glu | Ala |
| Ser        | Asp | Leu | Ile | Arg | Gln | Asn | Met | Leu | Arg | Leu | Asn | Ile | Tyr | Leu | Glu |
| Asp        | Leu | Ser | Val | Val | Glu | Tyr | Arg | Gln | Leu | Pro | Ala | Tyr | Gly | Leu | Ala |

Asp Leu Phe Ala Asp Ile Gly Gly Thr Leu Gly Leu Trp Met Gly Ile  
 530 535 540  
 Ser Val Leu Thr Ile Met Glu Leu Ile Glu Leu Val Ile Arg Leu Thr  
 545 550 555 560  
 Gly Leu Val Phe Asn Ser Glu Lys Gly Leu Pro Arg Gly Pro Thr Thr  
 565 570 575  
 Val Asn Asn Asn Asn Gly Ser Asn Asn His Ser Gln Ser Thr Ser Gln  
 580 585 590  
 His Gln Leu Tyr Asn Gly Tyr Met Asp His Asp Ser His Tyr Ser Asp  
 595 600 605  
 Ser Ala Gly Ala Ser Val Phe Asp Phe Arg Arg Gly Val Glu Ser Pro  
 610 615 620  
 Val  
 625  
 <210> 14  
 <211> 564  
 <212> PRT  
 <213> C. elegans  
 <220>  
 <221> SITE  
 <222> (180)  
 <223> Xaa represents 207 non-disclosed amino acids  
 <400> 14  
 Met Ser Trp Met Gln Asn Leu Lys Asn Tyr Gln His Leu Arg Asp Pro  
 1 5 10 15  
 Ser Glu Tyr Met Ser Gln Val Tyr Gly Asp Pro Leu Ala Tyr Leu Gln  
 20 25 30  
 Glu Asn Thr Lys Phe Val Thr Glu Arg Glu Tyr Tyr Glu Asp Phe Gly  
 35 40 45  
 Tyr Gly Glu Cys Phe Asn Ser Ser Glu Ser Glu Val Gln Cys Glu Leu  
 50 55 60  
 Ile Thr Gly Glu Phe Asp Pro Lys Leu Leu Pro Tyr Asp Lys Arg Leu  
 65 70 75 80  
 Ala Trp His Phe Lys Glu Phe Cys Tyr Lys Thr Ser Ala His Gly Ile  
 85 90 95  
 Pro Met Ile Gly Glu Ala Pro Asn Val Tyr Tyr Arg Ala Val Trp Val  
 100 105 110  
 Met Leu Phe Leu Gly Cys Met Ile Met Leu Tyr Leu Asn Ala Gln Ser  
 115 120 125  
 Val Leu Asp Lys Tyr Asn Arg Asn Glu Lys Ile Val Asp Ile Gln Leu  
 130 135 140

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Lys | Phe | Asp | Thr | Ala | Pro | Phe | Pro | Ala | Ile | Thr | Leu | Cys | Asn | Leu | 145 | 150 | 155 | 160 |
| Asn | Pro | Tyr | Lys | Ala | Ser | Leu | Ala | Thr | Ser | Val | Asp | Leu | Val | Lys | Arg | 165 | 170 | 175 |     |
| Thr | Leu | Ser | Xaa | Glu | Ile | Trp | Thr | Tyr | Leu | Gln | Gly | Gly | Thr | Pro | Thr | 180 | 185 | 190 |     |
| Glu | Asp | Pro | Asn | Phe | Leu | Glu | Ala | Met | Gly | Phe | Gln | Gly | Met | Thr | Asp | 195 | 200 | 205 |     |
| Glu | Val | Ala | Ile | Val | Thr | Lys | Ala | Lys | Glu | Asn | Ile | Met | Phe | Ala | Met | 210 | 215 | 220 |     |
| Ala | Thr | Leu | Ser | Met | Gln | Asp | Arg | Glu | Arg | Leu | Ser | Thr | Thr | Lys | Arg | 225 | 230 | 235 | 240 |
| Glu | Leu | Val | His | Lys | Cys | Ser | Phe | Asn | Gly | Lys | Ala | Cys | Asp | Ile | Glu | 245 | 250 | 255 |     |
| Ala | Asp | Phe | Leu | Thr | His | Ile | Asp | Pro | Val | Phe | Gly | Ser | Cys | Phe | Thr | 260 | 265 | 270 |     |
| Phe | Asn | His | Asn | Arg | Thr | Val | Asn | Leu | Thr | Ser | Ile | Arg | Ala | Gly | Pro | 275 | 280 | 285 |     |
| Met | Tyr | Gly | Leu | Arg | Met | Leu | Val | Tyr | Val | Asn | Ala | Ser | Asp | Tyr | Met | 290 | 295 | 300 |     |
| Pro | Thr | Thr | Glu | Ala | Thr | Gly | Val | Arg | Leu | Thr | Ile | His | Asp | Lys | Glu | 305 | 310 | 315 | 320 |
| Asp | Phe | Pro | Phe | Pro | Asp | Thr | Phe | Gly | Tyr | Ser | Ala | Pro | Thr | Gly | Tyr | 325 | 330 | 335 |     |
| Val | Ser | Ser | Phe | Gly | Leu | Arg | Leu | Arg | Lys | Met | Ser | Arg | Leu | Pro | Ala | 340 | 345 | 350 |     |
| Pro | Tyr | Gly | Asp | Cys | Val | Pro | Asp | Gly | Lys | Thr | Ser | Asp | Tyr | Ile | Tyr | 355 | 360 | 365 |     |
| Ser | Asn | Tyr | Glu | Tyr | Ser | Val | Glu | Gly | Cys | Tyr | Arg | Ser | Cys | Phe | Gln | 370 | 375 | 380 |     |
| Gln | Leu | Val | Leu | Lys | Glu | Cys | Arg | Cys | Gly | Asp | Pro | Arg | Phe | Pro | Val | 385 | 390 | 395 | 400 |
| Pro | Glu | Gly | Ala | Arg | His | Cys | Asp | Ala | Ala | Asp | Pro | Val | Ala | Arg | Arg | 405 | 410 | 415 |     |
| Cys | Leu | Asp | Ala | Arg | Met | Asn | Asp | Leu | Gly | Gly | Leu | His | Gly | Ser | Phe | 420 | 425 | 430 |     |
| Arg | Cys | Arg | Cys | Gln | Gln | Pro | Cys | Gly | Gln | Ser | Ile | Tyr | Ser | Val | Thr | 435 | 440 | 445 |     |
| Tyr | Ser | Pro | Ala | Lys | Trp | Pro | Ser | Leu | Ser | Leu | Gln | Ile | Gln | Leu | Gly | 450 | 455 | 460 |     |



Ser Cys Asn Gly Thr Ala Val Glu Cys Asn Lys His Tyr Lys Glu Asn  
 465 470 475 480  
 Gly Ala Met Val Glu Val Phe Tyr Glu Gln Leu Asn Phe Glu Met Leu  
 485 490 495  
 Thr Glu Ser Glu Ala Tyr Gly Phe Val Asn Leu Leu Ala Asp Phe Gly  
 500 505 510  
 Gly Gln Leu Gly Leu Trp Cys Gly Ile Ser Phe Leu Thr Cys Cys Glu  
 515 520 525  
 Phe Val Phe Leu Phe Leu Glu Thr Ala Tyr Met Ser Ala Glu His Asn  
 530 535 540  
 Tyr Ser Leu Tyr Lys Lys Lys Lys Ala Glu Lys Ala Lys Lys Val Ala  
 545 550 555 560  
 Ser Gly Ser Phe

<210> 15  
 <211> 24  
 <212> DNA  
 <213> degenerate primer

<220>  
 <221> modified\_base  
 <222> (various\_positions)  
 <223> "n" at positions 6, 9, 12, 15 & 16 represents  
 "inosine", while "n" at position 18 represents A,  
 T, C, G or unknown

<400> 15  
 ttyccngcncr tnacnntntg yaay

24

<210> 16  
 <211> 26  
 <212> DNA  
 <213> degenerate primer

<220>  
 <221> modified\_base  
 <222> (various\_positions)  
 <223> "n" at positions 3, 6, 9, 11 & 12 represents  
 "inosine", while "n" at positions 15 & 18 represents A,  
 T, C, G or unknown

<400> 16  
 canarnccna nntgncncnc dawrtc

26

<210> 17  
 <211> 20  
 <212> DNA  
 <213> primer

<400> 17  
 attgctcttc ccatctctat

20

~~<210> 18  
<211> 20  
<212> DNA  
<213> primer~~

<400> 18  
ttcaaggccc atacctaagt

20

Full  
CID  
cont